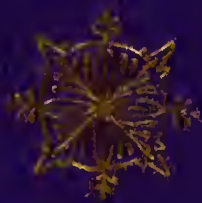


A SEASON AT ST MORITZ



MR. BURNEY YEO

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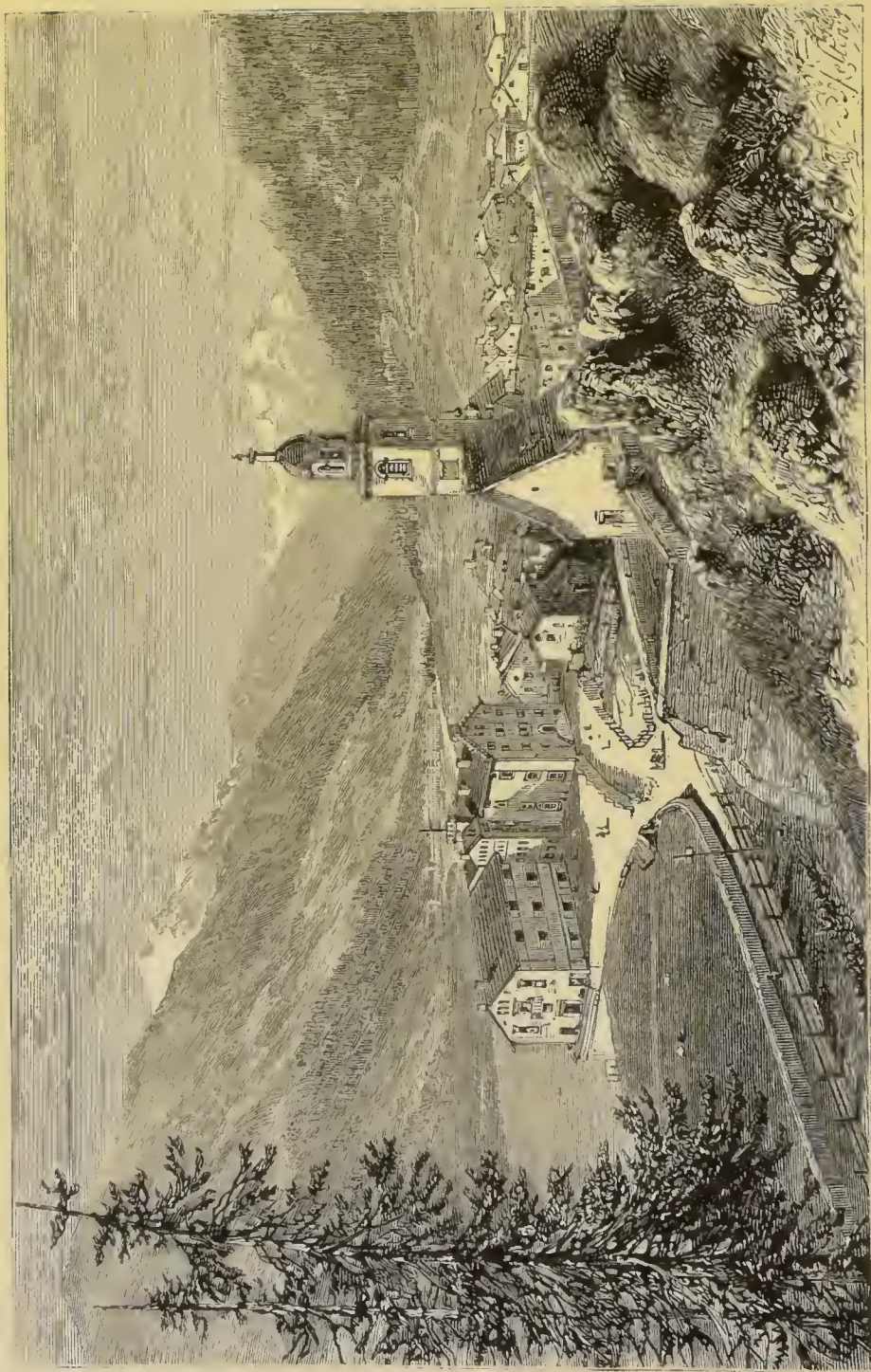
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Dr. William Fane
from the author

ST. MORITZ.

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Frontispiece

VIEW OF ST. MORITZ AND THE UPPER ENGADINE

NOTES
OF
A SEASON AT ST. MORITZ
IN THE UPPER ENGADINE

AND OF
A VISIT TO THE BATHS OF TARASP.

BY
J. BURNEY YEO, M.B. LOND.

ASSISTANT-PHYSICIAN TO KING'S COLLEGE HOSPITAL, AND LECTURER ON
ANIMAL PHYSIOLOGY IN KING'S COLLEGE, LONDON.

*'Premier Médecin...Si rien ne nous réussit, nous l'enverrons aux bains.
L'Apothicaire.....Voilà le fin, cela; voilà le fin de la médecine.*

MOLIÈRE.

LONDON:
LONGMANS, GREEN, AND CO.
1870.

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PREFACE.

THE FOLLOWING 'NOTES' are the result of an autumn vacation spent, for the most part, at St. Moritz, in the Upper Engadine. Some portions of them have already appeared in the pages of the 'Medical Times and Gazette.'

I had intended to have incorporated with these Notes, which now refer chiefly to the medical aspects of the health resorts of this region, some more general details of the interesting country which surrounds them; but as the season again came round for providing an answer to the frequently puzzling question, 'Where shall we go?' I found the leisure at my disposal quite inadequate to fulfil satisfactorily such an undertaking—at any rate for the present.

The chapter on the Flora of the Engadine is, I am aware, imperfect, and for the same reason; yet I hope I may be permitted to claim for it the same kind of qualified praise which I heard a lady bestow on the 'Kurmusik' at St. Moritz—viz. that it is 'better than nothing.'

J. BURNEY YEO.

60 ST. JAMES'S STREET, S.W.

June 1870.

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THE
NEW ENGLISH CHURCH AT ST. MORITZ.

WITH REGARD to the erection of an English Church at St. Moritz; to which allusion is made at p. 24, the author desires to add, that a sum of about 600l. pounds has been subscribed towards the undertaking; of this sum 100l. has already been expended, and a contract has been signed, or will be so in a very short time, with a local builder, to complete the fabric for 25,000 francs.

It would appear that the expense of building in this locality has proved greater than had been anticipated, and a considerable sum is therefore still needed in order to meet the liabilities which have been incurred. Subscriptions will be gladly received by the Treasurers, Henry R. Freshfield Esq., 6 Sussex Square, Hyde Park, W. and L. M. Rate, Esq., 9 South Audley St. W., also by the Rev. A. B. Strettell, the resident chaplain.

A SEASON AT ST. MORITZ.

CHAPTER I.

A FEW NOTES ON THE WAY.

‘Then, follow me.’—*Tennyson*.

IF you leave London at forty minutes past seven in the morning, you can, by the Dover and Calais route, reach Paris with tolerable punctuality at six o'clock the same evening, as most people know. Arriving in Paris at 6 P.M., you can leave Paris for Switzerland by express train at 8.5 P.M., and thus reach Bâle about nine o'clock the next morning. At Bâle there is just time to wash, shave, ‘brush up,’ and get an excellent breakfast at the railway station, before the train starts at 10.30 for Chur. At Zürich, if you are so disposed, you can quit the train, and cross the lake to Rapperschwyl by steamer, an agreeable change in hot weather. At Rapperschwyl you join the train again, and in a short time reach the beautiful Lake of Wallenstadt. The railway runs along the shore of this lake in nearly its whole length, and so enables the traveller to see its wild and grand scenery to considerable advantage. Soon after leaving the shores of the Lake of Wallenstadt the train reaches Ragatz, where most persons who have not already seen the Baths of Pfeffers remain a few hours in order to visit the remarkable gorge where these hot springs have their source. In less than half an hour from Ragatz the railway comes to an end at Chur, where I arrived at seven o'clock on the evening of the 2nd of August, having left London on the morning of the 1st. It is possible to proceed on one's journey to St. Moritz by night diligence, which leaves Chur at twelve o'clock; but most persons who are travelling for *pleasure* will prefer, as I did, to take a

night's rest after thirty-six hours of uninterrupted railway travelling.

The hotels at Chur had, at one time, a very indifferent and unsavoury reputation, but one at least, the Hotel Steinboek, can now be recommended as fairly clean and comfortable. It is a comfort also to know, whilst one hears the barbarous *Romansch* tongue spoken all round one, that they understand English at this hotel, and speak English which can be understood.

Those who have never read the following description of Chur by Thackeray will be glad to see it now:—

‘The pretty little city,’ he observes in one of the ‘Round-about Papers,’ ‘stands, so to speak, at the end of the world—of the world of to-day, the world of rapid motion, and rushing railways, and the commerce and intercourse of men. From the northern gate the iron road stretches away to Zürich, to Basel, to Paris, to home. From the old southern barriers, before which a little river rushes, and around which stretch the crumbling battlements of the ancient town, the road bears the slow diligence or lagging vetturino by the shallow Rhine, through the awful gorges of the *Via Mala*, and presently over the *Spugen* to the shores of *Como*.

‘I have seldom seen a place more quaint, pretty, calm, and pastoral than this remote little Chur. What need have the inhabitants for walls and ramparts, except to build summer-houses, to trail vines, and hang clothes to dry? No enemies approach the great mouldering gates; only at morn and even the cows come lowing past them, the village maidens chatter merrily round the fountains, and babble like the ever-voluble stream that flows under the old walls. The schoolboys, with book and satchel, in smart uniforms, march up to the *Gymnasium*, and return thence at their stated time. There is one coffee-house in the town, and I see one old gentleman goes to it. There are shops with no customers seemingly, and the lazy tradesmen look out of their little windows at the single stranger sauntering by. There is a stall, with baskets of queer little black grapes and apples, and a pretty brisk trade with half a dozen urchins standing round. But, beyond this, there is scarce any talk or movement in the street. There’s nobody at the book-shop. “If you will have the goodness to come again in an hour,” says the banker, with his mouthful of dinner at one o’clock, “you can have the money.” There is nobody at the hotel, save the good landlady, the kind waiters, the

brisk young cook who ministers to you. Nobody is in the Protestant church (oh! strange sight, the two confessions are here at peace!)—nobody in the Catholic church, until the sacristan, from his snug abode in the cathedral close, espies the traveller eyeing the mousterns and pillars before the old shark-toothed arch of his cathedral, and comes out (with a view to remuneration possibly) and opens the gate, and shows you the venerable church, and the queer old relics in the sacristy, and the ancient vestments (a black velvet cope, amongst other robes, as fresh as yesterday, and presented by that notorious “pervert” Henry of Navarre and France), and the statue of St. Lucius, who built St. Peter’s Church, opposite No. 65 Cornhill. His statue appears surrounded by other sainted persons of his family. With tight red breeches, a Roman habit, a curly brown beard, and a neat little gilt crown and sceptre, he stands, a very comely and cheerful image.

‘What a quiet, kind, quaint, pleasant, pretty old town! Has it been asleep these hundreds and hundreds of years, and is the brisk young Prince of the Sidereal Realms in his screaming car drawn by his snorting steel elephant coming to waken it? Time was when there must have been life and bustle and commerce here. These vast, venerable walls were not made to keep out cows, but men-at-arms, led by fierce captains, who prowled about the gates, and robbed the traders as they passed in and out with their bales, their goods, their pack-horses, and their wains. Is the place so dead that even the clergy of the different denominations can’t quarrel? Why, seven or eight, or a dozen, or fifteen hundred years ago—a dozen hundred years ago, when there was some life in the town, St. Lucius* was stoned here on account of theological differences, after founding a church in Cornhill.’

* Dean Stanley observes that King Lucius is the reputed ‘founder of the originals of many English churches—St. Peter’s Cornhill, Gloucester, Canterbury, Dover, Bangor, Glastonbury, Cambridge, Winchester. He it was who was said to have converted the two London temples into churches’ (the Temple of Apollo at Westminster, and the Temple of Diana at St. Paul’s). ‘Of him, too, the story is told how the British king deserted his throne to become a Swiss bishop at Coire in the Grisons, where in the cathedral are shown his relics, with those of his sister Emerita, and high in the woods above the town emerges a rocky pulpit, still bearing the marks of his fingers, from which he preached to the inhabitants of the valleys, in a voice so clear and loud that it could be heard on the Lucienstieg (the Pass of Lucius) twelve miles off.’—*Stanley’s Memorials of Westminster Abbey*.

‘Lucius, the first Christian king of this realm, (who, about 100 years before Christ, received the Christian faith from the holy Pope of Rome and

The evening I arrived in Chur the rain poured down in torrents, and the surrounding mountains were concealed by a dense covering of mist, while the swollen Rhine, struggling along its shallow bed and overflowing its very low banks, looked on the whole a dirty, straggling, and untidy river. The first hotel I applied to for admission was full: it was the nearest to the railway station, and no one cared to go a foot further than was absolutely necessary on such a night. Another plunge through the driving, soaking rain, and the Hotel Steinbock is reached, and here there is *one* room to be disposed of. It was not pleasant to think of a drive of fifty miles over the mountains, into the Engadine, in weather like this. Happily, the next morning dawned on a very different day.

From Chur to St. Moritz is a day's journey by diligence. At four o'clock in the morning after my arrival I was roused from my slumbers in a somewhat sulky mood, for one does not get reconciled immediately to the early hours of the country, and I prepared to take my place in the diligence which leaves Chur for St. Moritz punctually at 5 A.M. I joined the crowd of passengers surrounding the vehicles, some going by the Splügen and the Bernardino into Italy, others bound as I was for the Engadine. A motley group we formed at this early morning hour—Swiss, Germans, French, Italians, Americans, English, mixed up together, and on the whole looking rather gloomy and taciturn. Some were unmistakably invalids: their languid, drooping appearance and pale faces marked them out as fellow-travellers seeking, I trust with no delusive hope, a renewal of health and vigour from the iron-waters and the mountain air of St. Moritz. As it happened to be just the very height of the season, the number of passengers desirous of proceeding into the Engadine was unusually large, and, in addition to the ordinary diligence, vehicles of various kinds were pressed into the service. Old and wide-awake travellers had, days and days ago, made use of the telegraphic wires, and secured for themselves places in the *coupé* or the *banquette* of the diligence

martyr Eleutherius, by the ministry of the holy monk Fagan, whom some call Fagan and Damian,) immediately after that he was by the said holy monk baptised and instructed in the true profession of Christ's religion, did destroy the temple that then stood here at Westminster dedicated to the idol Apollo, and in place thereof erected a new temple to the honour of the True God, our Saviour Jesus Christ, and of St. Peter.'—Speech of Feckenham, Abbot of Westminster (1555), quoted in Stanley's *Memorials*.

—a very necessary precaution, if you desire to see in comfort the fine scenery through which you will have to pass. Those who fail to do so are compelled to accept such accommodation as the officials at Chur choose to provide for them. It may be a place in the interior of the diligence, with small chance of seeing to advantage the beauties of the country; or you may be squeezed into the inside of a narrow omnibus, as was my lot.

There are two routes from Chur into the Engadine traversed daily by diligences—one by the Albula to Samaden, the chief place in the Engadine, about three miles from St. Moritz; the other by the Julier Pass to Silva Plana and St. Moritz. The latter is the shorter route of the two for those intending to stay at St. Moritz. The former is more convenient for those who intend making Samaden or Pontresina their head-quarters. The road as far as Tiefenkasten is the same for both routes.

In rather more than an hour from Chur we reached the pleasant village of Churwalden, 3,976 feet above the sea. Churwalden is a 'cure-place' (*kurort*), and this reminded me that we were now in a country of 'cures.' Switzerland has been called the 'playground' of Europe; with almost equal justice it might be termed the 'Kurhaus' of Europe. The mineral springs of this country are indeed most abundant—saline, chalybeate, sulphurous, and simply thermal; but it is not to its mineral sources merely that Switzerland trusts in order to restore lost health, and to bring back declining powers to the invalids of Europe; it has also its mountain-air cure, its whey cure, its grape cure, and a facetious German fellow-traveller assured us that it was likely soon to add another to this list, in the form of a sandwich-cure. So that it is no uncommon thing in this country to meet with an individual who, as Émile Souvestre has observed in one of his charming Swiss sketches, '*après une cure de bains à Bex, faisait une cure d'air au Selisberg, pour continuer par une cure de chaud lait dans la Gruyère, et finir par une cure de raisin à Clarens.*'

But if Switzerland is *par excellence* the land of cures, the Canton Graubünden—through which we are now journeying—is *par excellence* the canton of cures; and nearly every third village is a 'kurort,' and has its 'kurhaus,' its 'kurliste,' its 'kurarzt,' its 'kurmusik,' and finally its 'kuristen,' as those are termed who come to be cured.

Churwalden, then, is a kurort, and ought to have had a kurhaus, for not long ago a company was formed in order to build one. An architect from Zurich was engaged, a site was fixed upon and plans were drawn; but then the shareholders quarrelled, and the design was abandoned; thereupon the two hotels of the place, the Krone and the Post, were greatly increased and 'done up,' and many private houses were prepared for the reception of the 'kuristen.' This place has really many attractions; it is within an easy distance of Chur, and it is most pleasantly situated in a mountain valley, running from north to south, watered by the Rabiosa, and rich in woods and meadows. Its climate is represented as being extremely mild, its summer temperature moderate and very little variable; and, unlike many other high mountain valleys, it is singularly free from extremes of heat and cold; so that during the summer months it has no frosts and no oppressive heat, no fogs, very little damp, no snow, a remarkably small rainfall, and but few storms. In these respects it compares favourably with other high stations, such as St. Moritz. Interesting walks and excursions abound in all directions. It seems to answer excellently well as a temporary resting-place for persons who are recovering from the effects of exhausting diseases, and who are too weak to undertake a longer journey to a more distant or higher mountain-station, for which also it serves well as a preparation.

It is certainly to be recommended that weak and delicate persons should not proceed at once from the lower health resorts to a very high mountain valley, like the Upper Engadine, but should remain for a time in a moderately elevated situation, such as Churwalden, as an intermediate step between the relaxing temperature of the low valleys and the somewhat rigorous air of very elevated localities, such as St. Moritz or Davos. The special curative means which are provided at Churwalden are cows' and goats' milk, whey, and wild strawberries, and conveniences for a regular course of baths. It is especially celebrated for its excellent white Alpine honey, which gained the prize medal at the Exhibitions of Paris and Berne. Woods of pine and birch cover the hills around. The season begins on June 1, and ends on September 30.

There is another 'kurort' between Churwalden and Tiefenkasten, which may be reached from Lenz, in about an hour and a half, by a footpath, turning off to the left of that village. I allude to the baths of Alveneu, frequented for the sake of a

sulphur-spring which has its source on the right bank of the Albula, more than 1,000 feet below the village of Alveneu. The village is situated on a steep slope about 1,100 feet above the river, and 4,344 feet above the sea, and commands a fine view. The 'Établissement des Bains' is built close to the mineral spring from which it derives its local celebrity, and is, therefore, some distance from the village. It is a large new building, and has only been constructed within the last three years.

The bathing establishment which previously existed here had not nearly so pretentious a character, and, indeed, afforded but rough accommodation to both patients and visitors. The new kurhaus, on the contrary, is large, and commodiously fitted up. It contains ninety-six bed-chambers, a large 'salle-à-manger,' 60 feet long by 25 broad, and a ladies' 'salon;' on the ground-floor there is a restaurant, with billiard and reading rooms.

There exists undoubted evidence that the reputation of the baths of Alveneu extends as far back as the fifteenth century, and we are told that in 1470 there was 'a commodious hostelry at Alveneu (Alvenum Novum) for the reception of the numerous bathers.' As one approaches the source of the mineral spring an unpleasant odour of sulphuretted hydrogen is observed, and this, as well as the flocculent, whitish precipitate which covers the soil around the source, indicates that it contains a considerable proportion of sulphur. The spring yields about 450 quarts of water per minute, of a temperature of 45° or 46° F. It is perfectly clear, but not sparkling, and when shaken it gives out a strong smell of sulphuretted hydrogen. It has a soft and 'agreeable' (!) taste. I append a recent analysis of this source.* The waters are used both for drinking and bathing.

* *In 1,000 parts of the Water:—*

Sulphate of sodium	. . . . .	·0199
Chloride	„	·0014
Sulphate of potassium	. . . . .	·0101
„ calcium	. . . . .	·9545
Bicarbonate of magnesium	. . . . .	·2034
„ protoxide of iron	. . . . .	·0011
Phosphate of aluminium	. . . . .	·0047
Silica	. . . . .	·0038
		<hr/>
Total solid constituents	. . . . .	1·3381
Free carbonic acid	. . . . .	·0227
„ sulphuretted hydrogen	. . . . .	·001338

The cases in which they are reputed to be especially useful are those of chronic rheumatism, gout, neuralgia, the various forms of scrofula, certain chronic skin diseases, affections of the pelvie viscera in females, chronic lead and mercurial poisoning, and some other chronic maladies. It has been observed that patients exhale from their skins the odour of sulphur long after their departure from the baths.

Compared with other sulphur springs, such, for instance, as the one at Harrogate, that at Moffatt in Scotland, those at Aix-les-Bains, Aix-la-Chapelle, and especially at Shinsnaeh, near the Swiss Baden, the waters of Alveneu are very feebly mineralised, and apart from its situation and mountain climate it possesses no special claims to the attention of invalids who live out of the immediate district. I cannot resist the temptation to quote the following passage taken from a pamphlet published at the baths. It is a good specimen of what one may term bath literature; its sweeping generalities and meaningless phraseology recall to one's mind some of the medical talk that has been so severely and amusingly satirised in the comedies of Molière.

'L'action de l'eau minérale d'Alveneu se caractérise en somme par son action *stimulo-altérante sur la nutrition en général* par suite de la production d'une *surexcitation vitale* avec augmentation de l'activité des *sécrétions* de la *muqueuse intestinale* des reins et de la *peau*, sans parler de son *influence spéciale* sur les organes *intra-pelviens*. Il résulte de cette révolution dans la sphère végétative de l'économie une réaction *vivifiante et fortifiante* sur l'ensemble du système nerveux.'

I have preserved the italics of the original.

At Tiefenkasten, sixteen miles from Chur, the two roads into the Engadine diverge, that of the Albula to the left, that by the Julier to the right. At this village and the adjacent hamlet of Solis, we find more mineral springs. The spring at Solis is named the 'Donatus Quelle,' that at Tiefenkasten the 'St. Peter's Well.' The torrent of the Albula, which flows below Tiefenkasten in a deep, narrow, and rocky bed, passes under a remarkable bridge near Solis, in a very bold situation, said to be 1,458 feet above the level of the stream.

The well at Solis contains a very minute quantity of iodide of sodium, less than the one-hundredth part of a grain in a pound of the water. We are requested to believe that this constituent imparts to the spring a remarkable efficacy in cases of goître, scrofula, and chronic visceral enlargement.

we are expected, moreover, to believe this chiefly on theoretical grounds, for but little practical knowledge of the therapeutic action of the water has hitherto been attainable, since there is no bath establishment at Solis, and but a few patients, at Alveneu and Churwalden, are reported to have drunk the water with advantage.

It will be seen from the analysis of this spring which I append that it contains a considerable quantity of chloride of sodium, still more of the sulphate of sodium, and a small amount of iron; * the good effects, therefore, which it produces may certainly be attributed with more reason to the action of these salts than to the influence of the mere trace of iodide of sodium which it contains. The proprietors of the well, doubtless, desire to fix upon it a distinctive character, and this they do by calling it an iodised spring! The only spring in Switzerland which contains any considerable quantity of iodine is the one at Wildegg, a small village on the right bank of the Aar, between Aarau and Schinznach; it contains thirty times as much iodide of sodium as the well at Solis. The composition of the water of the Donatus Quelle resembles most closely that of the saline springs of Franzensbad in Bohemia. It is in truth a mild saline aperient water, which may doubtless be useful, as other waters of this class are generally found to be, in cases of dyspepsia associated with constipation and a congested condition of the abdominal viscera. The waters of Tarasp in the Lower Engadine are, however, much more likely to be efficacious in such conditions.

The St. Peter's Well at Tiefenkasten is situated on the left

* Analysis of the 'Donatus Quelle' at Solis:—

In 1,000 parts.

Bicarbonate of calcium	. . . .	1.128
„ magnesium	. . . .	0.382
„ the protoxide of iron	. . . .	0.018
„ sodium	. . . .	0.290
Chloride of sodium	. . . .	1.215
Iodide of sodium	. . . .	0.001
Sulphate of sodium	. . . .	2.040
„ potassium	. . . .	0.070
Silica	. . . .	0.014
Phosphate of alumina	. . . .	0.006

Traces of boracic acid, manganese, bromine, and lithium.

Free carbonic acid, about 12 cubic inches in a pound (32 cubic inches) of the water.

bank of the Albula, about twenty minutes' walk from the village. It is proposed to build a 'trinkhalle' here, but at present the waters are chiefly exported, and but rarely drunk at the source. The composition of this spring is very like that of Rippoldsau in the Black Forest, and it does not differ greatly from that of the St. Moritz springs.* It contains nearly as much iron as the latter, but not more than half the quantity of free carbonic acid; it differs chiefly, however, from the St. Moritz water in containing a considerable amount of the aperient sulphate of sodium, and a small quantity of the aperient sulphate of magnesium; but, notwithstanding this, it is apt at first to produce constipation, owing to the great amount of salts of lime which it contains. The local physicians recommend the addition of a little Epsom salts to the water when it acts in the way I have just stated. It is somewhat disappointing to be told that we can improve upon the composition of a mineral spring so far away from home by the addition of such a very homely medicine as Epsom salts! I shall only add that it is applicable to exactly the same cases as the St. Moritz springs.

I have already observed that to the traveller who is bound for St. Moritz the Pass of the Julier affords a somewhat shorter journey than that by the Albula. The latter route can be taken in returning from the Engadine, so as to avoid going twice over the same ground. For my own part I would say, as M. Michelet does in choosing between the two routes, 'Je préfère les grandes voies historiques où l'humanité a passé.' Such an 'historical road' is the Pass of the Julier. That it was frequented by the Romans is very certain, since Roman remains have been discovered in several places in the Oberhalbstein Valley, at the head of which there is also another

* The following is the analysis of the St. Peter's Well at Tiefenkasten:—

In 1,000 parts.

Sulphate of sodium	2.288
„ potassium	0.114
„ magnesium	0.214
„ lime	0.174
Bicarbonato of lime	1.520
„ protoxide of iron	0.030
Chloride of sodium	0.587
Silica	0.037

Free carbonic acid, 29 cubic inches in a pound (32 cubic inches) of water.

important Roman road, the Septimer Pass, leading into the head of the Val Bregaglia.

But it is believed that long before the Romans occupied the province of Rætia this road was frequented by the earlier Celtic population of the country, and the name of the pass, instead of being derived from Julius Cæsar, would seem to owe its origin to the name of one of the Celtic gods — ‘Jul.’

In the middle ages, merchants, pilgrims, and crusaders teiled over this road on their way to Venice, which was then the gateway of the East; and ruins of mediæval castles may still be seen in many parts of the valley.

The Oberhalbstein Valley is entered immediately on leaving Tiefenkasten; it is nearly twenty-four miles long, and its scenery, as well as that of the side valleys which open into it, is very fine.

Pretty villages and hamlets are seen dotted about the mountain-sides; old towers and ruins appear on the heights; and for every village there is a little church, with its pointed spire. Most of these churches are very picturesque, and, considering the size of the villages or hamlets to which they belong, even ambitious in their character. They are built after the Italian style, and are frequently adorned externally with curious frescoes, the work of itinerant painters. The inhabitants of this valley are Roman Catholics. Sometimes one sees a church perched up apparently in a most inconvenient and inaccessible position, where churchgoing in bad weather must be an arduous if not a perilous undertaking. I cannot sympathise with that Protestant writer who, passing through this mountain valley and seeing these churches, could find no other thought to give expression to than this: ‘Le vieux catholicisme pèse encore lourdement dans une grande partie du pays.’ To me, I own, it was a refreshing sight, weary and oppressed as one becomes with the cold formalism and somewhat dreary respectability which with us seems almost essentially to belong to our Church, from its extremely *professional* character, and which take the very heart and soul out of religion; to me it was cheering to think that here, at least, in these little churches, with their attendant priests, high up on the mountain-sides, and for many months surrounded by snow, with only a few peasants and their families for a congregation, the Church must be a *service*, and not a profession, and that that faith must be fuller, stronger, and purer which seeks a home

and an expression in uneongenial spots like these, than that which delights in rich benefices and comfortable parsonages.

Below the villages there are cultivated fields, and above them, amidst the mountains, extend woods and green meadows; and above these, again, appear the jagged mountain summits closing in the landscape on every side.

At Mühlen or Molins, a village about thirty miles from Chur, and eighteen from St. Moritz, is the most welcome dining station. An early and a hasty breakfast (at 4.30 A.M.), followed by a drive of thirty miles through high mountain valleys, sharpens the appetite wonderfully, and notwithstanding the beauty of the scenery, I was not able to resist, during the hour preceeding our arrival at Mühlen, a tendency to speculate on the resources of the hostelry we were approaching. They proved to be abundant and excellent. We all quickly seated ourselves at table, and, so far as my own limited range of observations extended, we all did ample justice to the very wholesome fare which was set before us. Mühlen is the place generally selected as a resting-point by those who are not equal to making the entire journey from Chur to St. Moritz, or from St. Moritz to Chur in one day. It serves admirably for this purpose, not only on account of the excellent accommodations to be found at the inn there, but also because it is placed in the centre of the finest scenery of the Oberhalbstein Valley, and is surrounded by some of the highest peaks in this district.

The road, gradually ascending, reaches, in about six miles from Molins, the last and highest village in the Oberhalbstein—Stalla or Bivio. Here the two roads divide—the high road over the Julier Pass lying due E.; that into the Val Bregaglia, over the Septimer, mounting SSW. For about two hours from Stalla the diligence winds slowly up a very well made road, which leads in numerous zigzags to the summit of the Julier Pass.

Most of us now descended from our various conveyances and proceeded to walk up to the summit of the pass, making short cuts over rather rough ground, and leaving the carriages far behind. The air was keen and bracing, and one was reminded of the observation made by the author of the 'Regular Swiss Round,' that 'many thousand Roman noses have been pinched blue with the sharp air of the Julier.'

The pass of the Julier is a scene of mixed grandeur and desolation. The most perfect silence and stillness prevailed on

every side, broken only by the cracking of the whips of the postboys. No tree, no blade of grass, nothing but huge stones, hurled down from the decaying mountains around, with here and there a patch of snow.

The summit of the pass is formed by a flattened ridge extending between two high granite mountains—the Piz Munteratsch and the Pulaschin. A little lake lies on the highest point of the pass, and near it there are two curious roughly hewn granite pillars, about three or four feet high, one on each side of the road, concerning the history of which there has been much discussion.

Their erection has been erroneously ascribed to Julius Cæsar, but many consider them to belong to a much earlier date, and to derive their name Julius from that of the Celtic sun-god Jul, and that they are Celtic sacrificial stones; but such sacrificial sites elsewhere (and there are many in Western Switzerland and in the interior of France) have a very different appearance. Older writers describe only one pillar; then it appears there were three. Murray states that recently, when some alterations were making in the road, one of these columns had to be removed, when some Roman coins were found at its base, bearing the name of Tacitus and the date of A.D. 275. Of all the passes of the canton this is the earliest free from snow, and it is also said to enjoy a remarkable immunity from avalanches.

The climate of the Oberhalbstein Valley, which ends in the pass of the Julier, is reported to be, on the whole, more inclement than that of other valleys lying equally high, because of its exposure to the north wind. Above Rofna there is but little cultivation. A great part of the soil is rocky and dry, and unfavourable for Alpine farming. The population is scanty; the inhabitants are for the most part tall and strong, and renowned of old for a brave and resolute demeanour. They speak the Romansch dialect.

The road begins to descend immediately after passing the Pillars of Julius, and soon the green meadows and blue lakes of the Upper Engadine, with the pretty village of Silva Plana, came into view—a somewhat sudden but pleasing transition from the wild and desolate scene which we were just leaving. Very beautiful indeed did this part of the valley appear on the day I crossed the Julier Pass. The clear, deep blue, unclouded sky; the rich green meadows, lit up with the soft and subdued light of the late afternoon sun; the wooded mountain-

sides, topped by the eternal snow-clad summits of the Bernina chain; the clear, still lakes, whose unruffled waters reflected, as in a mirror, blue sky and wooded mountain, clustering village and ice-clad summit, composed a scene which made me rejoice that I had exchanged, for some weeks at least, the hot and dusty streets of noisy London for the calm beauty and fresh breezes of this quiet Alpine valley.

Rapidly swept the diligence down the steep sloping zigzag that led from the summit of the pass to the village of Silva Plana. After a few minutes' delay at the post bureau we started again, and in about a quarter of an hour reached Campfer, a picturesquely situated village at the end of the Silva Plana lake, and about three miles from the village of St. Moritz, but not more than two miles from the baths. The Hôtel Julier at Campfer is becoming a favourite with English people: it is rather better kept than most of the hotels in the Engadine, and has a local reputation for its good dinners. On leaving Campfer the road continues on the left bank of the river, and we soon observe the Kurhaus of St. Moritz, placed in the meadows at the western extremity of the St. Moritz lake, looking 'like a union house in a fir plantation.' In a few minutes the diligence turns off from the high road in order to cross to the opposite bank of the river, and soon it draws up on the gravel drive in front of the Kurhaus.

Note.—A most agreeable route from Chur to St. Moritz, especially to those who have never visited the Via Mala, may be taken without delaying one's arrival at St. Moritz, by hiring a carriage at Chur and driving on to Thusis, on the same evening that one reaches the former place. This will take from two to three hours. From Thusis there is a most magnificent pass (the Schyn pass), to Tiefenkasten, equal to anything in Switzerland for grand and beautiful scenery. It is now open to carriages, and as it is only about ten miles in length, it is soon crossed, and the traveller can, by starting early in the morning, proceed into the Engadine by the Julier or the Albula the same day. The Via Mala is close to Thusis.

CHAPTER II.

NOTES AT ST. MORITZ.

‘ Somehow or other, our country people are like locusts, for they not only fly in myriads to distant countries, but as they travel they congregate in clouds, and therefore either are they found absolutely eating up a foreign country, or not one of them is to be seen there.’—*Sir Francis Head.*

ABOUT half-past five, on the evening of August 3, having left Chur at five in the morning of the same day, our diligence drove up in front of the Kurhaus at St. Moritz. None of my travelling companions could be said to have been in a happy frame of mind at that moment, nor indeed was I. We had arrived at the end of our journey, it was true, but not at the end of our anxieties. We had been warned in London, in Paris, at Bâle, at Zurich, at Chur, and indeed at every stopping-place on the road, that St. Moritz was full, full to overflowing. And so it proved to be. I was trusting, and trusting not in vain, as I was soon glad to find, to the kind offices of an excellent friend, who had secured an apartment for me at the Kulm Hôtel. But many were not so fortunate. The Kurhaus was quite full, and during the delay of the mail-coach there, some, desirous of learning their fate, hired an cin-spanner (a light carriage with one horse), and dashed on towards the village, determined to secure apartments if possible at the Kulm or perish in the attempt. Others had engaged rooms weeks ago, and had even received replies assuring them that apartments would be retained for them; but even this was not sufficient to allay the anxiety which the reports we had heard on the way had aroused. A painful expression of anxious uncertainty as to what might be our fate, for that night at least, was visible on all our countenances. In this unhappy condition we drove along the road bordering the pretty little St. Moritz lake, and in a very short time reached the village of St. Moritz, about a mile from the Kurhaus. Descending at the Bureau de Poste, confusion and disappointment soon became apparent amongst the numerous arrivals. Unprotected females in ones and twos, as well as in larger and more formidable groups, were making violent and as it seemed unsuccessful attempts to force an entrance into the chief hotel of the place; others were wandering about in a state of disconsolate

uncertainty, having received some kind of promise of accommodation, but almost fearing to discover what that accommodation might prove to be. Some of them, I regretted to see, were manifestly invalids, and, unfortunately, upon those, not unfrequently, the least attention was bestowed, so that very uncomfortable apartments fell to their lot.

I would take this opportunity of earnestly recommending all those who intend proceeding to St. Moritz, especially if they are in delicate health and unable to put up with comparatively rough accommodation, to be careful to secure comfortable apartments there before they leave England, and to remain at Chur or Churwalden, or some other convenient resting-place, until they have received positive assurance that these apartments are at their disposal.

Many invalids forget that this part of Switzerland is popular also with that large class of persons who travel habitually on the Continent, because of the easy accessibility of many of the higher Alpine summits and passes from this great elevation, as well as for the sake of the charming scenery of the Engadine itself. Now, these habitual tourists are well acquainted with that 'art of travel' without which travelling is neither an easy nor a pleasant occupation, and they, in many instances, occupy the very best quarters that can be had, and which they have been careful to secure beforehand; while many invalids who know little of travelling—perhaps have never left their homes before—come up into this now fashionable watering-place, having made no provision whatever for their reception, and they are therefore compelled to accept whatever accommodation they can obtain, no matter how rough that may be. They are turned away from the Kurhaus, they are turned away from the only good hotel in the place, and, after wandering about the village in search of a resting-place, they may finally obtain shelter in a room that is little better than a hayloft.

The hotel-keepers there are also no respecters of persons. I remember on one very cold evening in August I was requested to see a foreign lady of rank, who had brought an introduction to me from her physician in Paris. She was in delicate health, and travelling with another lady as a companion, and accompanied by a maid and man servant. I found them placed in a wretched little room, which I had to approach by a ladder, and which was placed over a hayloft. The man and the maid servant were on the landing. Whatever food they needed had to be brought from the nearest hotel. Now this lady had engaged

rooms some time before her arrival; but as she did not appear on the precise day she had named, they were not kept for her. Of course, roughing it in this way may be no great hardship to some people; but nervous ladies, in delicate health, arriving at St. Moritz on an August evening, with a keen wind blowing along the valley, and something suspiciously like snow in the air (and such evenings do occasionally occur in the Upper Engadine, even in August), are not likely to be benefited by even a temporary residence in something little better than a barn, with no possibility of a fire, and with nothing very acceptable in the way of food. It is to spare invalids this kind of misery that I would reiterate the advice I have just given, and that is—make perfectly certain as to what quarters you can command before you venture into St. Moritz in the height of the season. Besides the Kurhaus, the situation of which is objected to by many—it is built in flat marshy meadows, at the end of the lake of St. Moritz, about a mile from the village, and about 300 feet lower than its highest part—the principal hotel is the Engadiner Kulm, kept by Herr Badrutt, and built in the most agreeable and commanding part of the village, overlooking the lake. It is certainly the favourite with the English, and I think very deservedly so. The fare is occasionally somewhat frugal, but always sufficient; and considering the pressure that is put on their resources during the busiest part of the season, I think it must be admitted that the complaints that one sometimes hears of the food at this hotel are scarcely well founded. For my own part, I always found it good and sufficient (excepting always the toughness of the beef). The breakfasts at Herr Badrutt's I remember with the liveliest satisfaction. The coffee, I venture to say, is unsurpassed in Europe. M. Michelet, writing of the hotel at Samaden observes:—‘*Signe singulier, rare, de l'honnêteté de la maison : j'y trouvai du café, café non mêlé, véritable. Jamais, en trente ans de voyages, je n'ai trouvé cela que deux fois ; la première aux Pyrénées, près Gavarnie, et la seconde, à Samaden, dans l'hôtel de la Bernina.*’ Permit me, Monsieur Michelet, to add a third—the Engadiner Kulm Hôtel, at St. Moritz. It is not to be expected that at the *table d'hôte* of an hotel at St. Moritz one is to find a dinner such as is provided at Lueerne or Zürich; but it must, at the same time, be remembered, that the price of a dinner at the latter places covers a whole day's expenses at Herr Badrutt's. There are some second-class hotels in St. Moritz, which I recommend invalids

to avoid. There are also two or three *pensions* in the village; the best of them expensive, and generally requiring you to dine out, unless indeed you happen to belong to that privileged class who, when they travel, take their own cook with them, and can afford to pay heavily for the use of a kitchen. Herr Flugi's *pension* is the largest of these, and has been patronised by some noble English families; but it is not so comfortable as the best apartments at the Kulm Hôtel, and is certainly not so free from bad smells. Dr. Berry, the Swiss physician resident in the village, also receives visitors into his house; and it is sometimes possible to obtain accommodation in the house of the English chaplain (the Rev. A. B. Strettel), and in that of the Catholic priest.

On my arrival I did not find immediate accommodation at the Kulm, as I was a day later than I had expected to be, and my room was disposed of for two nights. I was provided, therefore, with a room in the village, which was very comfortable, save for the odours which penetrated it, and which appeared, from their nature, to proceed jointly from a cow-house and a cheese-store. It is the custom in the Engadine, even in houses which have a very showy appearance externally, to devote a part of the ground-floor to the accommodation of their live stock—cows, goats, fowls, &c.—and to their stores of various kinds; so that emanations from the occupants of the ground-floor must be tolerated by those who occupy the upper stories. I lived in the odour of cows for two days, when I cheerfully received intimation that the room destined for my reception was vacant, and I at once took and kept possession for the remainder of my stay at St. Moritz of a very pleasant little room in the new wing of the hotel, with two windows, one looking over the bright green lake and on to the wooded mountain-side opposite; the other overlooking the Kurhaus, and up the valley to the great Cima di Margna.

Before I attempt to describe St. Moritz, I desire to quote some ill-tempered remarks on the place by a clever writer in the number of 'Fraser's Magazine' for November 1869; by this means, as I do not agree with him, I shall have the advantage of the last word. He seems to have been terribly put out because, in the morning, he saw a king at St. Moritz, and in the evening he was confronted with a cockney.

He observes:—'Not long ago I was standing on the balcony of a well-known inn near the baths of St. Moritz. A little procession of ladies and gentlemen issued from the hotel, and

descended the slopes towards the banks of the lake. Immediately I became aware—I know not whether from positive information or from some instinctive sense of reverence—that for the first time in my life I was standing in presence of a genuine king.

‘A king is now a rarity, and I was proportionally delighted with the opportunity of discharging in my own person the functions of a Court Circular. His Majesty, I might say on my own authority, accompanied by his royal consort, and attended by the lords and ladies in waiting, took the recreation of a walk on the banks of the lake of St. Moritz. Yet a certain drop of bitterness mingled in my cup, and it was intensified by an incident which took place that evening. I was confronted at supper by a person belonging to a class unfortunately not so rare as that of royal personages—the genuine British cockney in all his terrors was before me. The windows of the dining-room opened upon all the soft beauty of a quiet Alpine valley on a summer evening. Far above us the snow-clad range of the Palü and Bernina glowed with the last rays of the setting sun. But the cockney was not softened by its influence, and he talked in full perfection the language of his native streets. He elaborately discussed the badness of the liquors provided for us: he tasted some of the bottle which I had ordered, and was peacefully consuming, and condescended to inform me that it was “devilish bad.”’ This writer continues:—

‘St. Moritz acts like one of those fly-traps to be seen in old-fashioned country inns, which do not indeed diminish the swarms of intrusive insects, but profess at least to confine them to one spot. And if any district were to be selected, into which the cockneyism of the surrounding Alps might be drained as into a reservoir, certainly no better selection could be made than St. Moritz. The upper valley of the Inn is one of the very few Alpine districts which may almost be called ugly. The high bleak level tract, with monotonous ranges of pine-forests, at a uniform slope, has as little of picturesque as can well be conceived in the mountains. Even in the great peaks, there is a singular want of those daring and graceful forms, those spires, and domes and pinnacles, which give variety and beauty to the other great mountain masses. I should rejoice if it could be made into a Norfolk Island of the Alps, and all kings, cockneys, persons travelling with couriers, Americans doing Europe against time, Cook’s tourists and their like, commercial travellers, and especially that variety of

English clergyman which travels in dazzling white ties and forces church service upon you by violence in remote country inns, could be confined within it to assail or annoy each other. Meanwhile, though this policy has not been carried out, it is gratifying that a spontaneous process of natural selection has done something of the kind. Like flies to like, the cockney element accumulates like the precious metal in the lodes of rich mines; and some magnificent nuggets may be found in and about St. Moritz.'

The same writer says in the same article:—'No one can appreciate good scenery when his digestion is out of order; few people can appreciate it with blisters on their feet, and not every one who is bitten of fleas.' Now I cannot help thinking that this gentleman must have left home suffering from a very severe form of indigestion, that his feet had not yet been trained to good walking condition, and that he had risen from a night of feverish and frequent conflicts with those intrusive insects which he mentions; and thus suffering from a threefold irritation, the sight of an innocent king and that of a still more innocent cockney were sufficient to make him anathematize St. Moritz and seek an asylum amongst the select circle of Italians at the baths of Santa Catarina.

As to the invasion of St. Moritz by the much-dreaded British cockney, it certainly appeared to me that the Upper Engadine, compared with other parts of Switzerland, was singularly free from the inroads of this somewhat obtrusive variety of the human species. Specimens doubtless do occasionally appear, and the habits of the creature are not such as to enable it to elude observation; but, then, where is it not found? The only objection that I know of to the presence of kings in a watering-place is, that they and their suites take up so much room. But for the rest, they are of modest and retiring habits, and generally as anxious for quiet and seclusion as even the writer in 'Fraser.'

That the Upper Engadine generally is picturesque and beautiful, is beyond any kind of doubt; and that its characteristic beauties are concentrated in a remarkable manner in St. Moritz, is equally true. Year after year the same visitors return to St. Moritz, and they are for the most part persons who are familiar with every kind of mountain scenery, and yet this place does not lose its charm for them.

As a set-off against the article in 'Fraser,' let me quote another from the 'Edinburgh Review.'

'The frequented and inhabited valleys of this region,' writes

an 'Edinburgh' Reviewer,* 'are so high above the sea-level, that the visitor is already on a platform of from 5,000 to 6,000 feet, even in his inn. Hence he starts from a "coign of vantage" for ascents, and is invigorated by sleeping in the purest and keenest air. He must not be surprised to see snow falling in the middle of July, or to experience a cutting blast after sunset which would do no discredit to December in Britain. We have been well-nigh chilled to death on an August evening while gazing at the Norwegian-looking lake of St. Moritz, from the village of the same name, which itself stands at an elevation of 6,000 feet above the sea.

'From this explanation it will be at once understood that mountaineering in this region becomes comparatively facile in relation to some particular summits. The finest and most accessible of all the famous views is that from the Piz Languard, and it is hard to refrain from enthusiasm in adverting to it. From this summit of 10,715 feet above the sea-level, if one has but a cloudless sky—an exceptional advantage, which we enjoyed in two ascents—spreads out to the eye, certainly one of the most extended, if not actually the most comprehensive, circle of snow-mountains to be seen from any one Alpine observatory of equal altitude.

'The distinguishing feature of this view is the multitude of snow-crowned summits on all sides, rather than the massiveness of many on one side, although it includes the imposing Bernina range. Every kind and shape of mountain seems to rise up and roll away into dim distance and indistinct azure. A whole day would be too brief to count and identify the several peaks, and the two or three hours of clear morning sky, ordinarily permitted, seem to fly away like minutes. A vast and varied relief mountain map is perhaps the best verbal description of the view. If all the world's icy kingdoms and the glories thereof were to be imagined as visible from one pinnae, assuredly the Languard would be its nearest representative. From the tops of Mont Blanc and Monte Rosa we embrace a far larger circle, but from neither one a panorama so distinct and so appreciable in details as that from the Languard. The altitude is sufficient to command a vast view, but not so extreme as to dwarf the visible mountains. Every candid mountaineer will confess that a height of about 10,000 feet is best adapted to a panoramic view. We may see more from a greater altitude, but we distinguish less definitively.

* July, 1869.

‘Pontresina or Samaden, the latter having a capital inn, is the spot we should specially commend to tourists of moderate physical ability, who desire new and grand Alpine views from points of ordinarily possible attainment. Some visitors, indeed, regard it with particular, and perhaps overweening, partiality; yet its future wide popularity may be safely prophesied. Not its least attractions are its remarkably invigorating air, and the old Valtelline wine there to be drunk. Some will delight themselves in its rich flora; and the little green-shuttered windows of several of the natives of these villages and towns are filled with bright flowers. Those who desire ice-work without danger, may easily walk over a great portion of the Morteratsch glacier, towards the bend of which a very grand near view of the Bernina mountains is obtained. Near the foot of the glacier is one of the most beautiful of waterfalls; while from the roadside, amidst rocks and firs, a view of the glacier is gained, which never fails to elicit enthusiastic admiration. The easy walk up the fine Roseg valley presents striking wood and rock views, with a beautiful termination of glaciers; while athletic mountaineers have before them excursions, including every degree of difficulty, up to the ascent of the highest peak of the Bernina, a height of 13,294 feet, which is of difficult and laborious attainment. The Piz Morteratsch, which is 12,316 feet, is a safe and, comparatively, not difficult expedition, while the view is probably nearly as impressive as that from the highest peak.’

The village of St. Moritz is the highest in the Upper Engadine, and the projecting ridge of rock upon which it is built is on this account termed the ‘Engadiner Kulm.’ The highest part, where the Kulm Hôtel stands, is placed at an altitude of 6,100 feet above the level of the sea, the general bed of the valley being about 300 feet lower. Green grassy meadows descend in gentle slopes from the village to the NW. shore of the beautiful little sea-green lake, the St. Moritzer See, which stretches across the valley to the wooded foot of the Piz Rosatsch, a huge mountain mass, part of the Bernina chain, which rises steeply on the opposite shore of the lake, its base covered with larch and pine trees, and its summit overhung by a great glacier mass. Herr Badrutt’s hotel is built so as to command one of the finest views in this part of the valley. Standing on the terrace of the hotel, directly opposite, rises the aforesaid Piz Rosatsch; to the right the view stretches far up the valley towards the Maloya



PIZ BERNINA

pass, overlooking the Kurhaus and its grounds, catching a glimpse of the series of lakes which extends up to the head of the valley, and forms one of its greatest beauties, and finally the eye rests on the gigantic outline of the Piz Margna, always a conspicuous object in this direction. Turning to the left, the view is extremely beautiful; the rich green meadows at the eastern end of the lake, with the dark pine woods which thickly cover the gentle elevation, concealing the village of Pontresina on the other side of it, forms a pleasant foreground; while directly behind Pontresina rises the great mountain-range which lies to the SE. of the Bernina road, and amongst which the pyramidal summit of the Piz Languard is a striking object. Still further to the left the rest of the upper valley of the Inn opens out—the white villages, the winding river, the somewhat bare-looking mountain-sides—at the end a grand mountain-range, whose wonderfully bold and rugged summits seem to close the valley in this direction, and they do indeed form the natural boundary of the Upper Engadine. Few mountain masses that I have ever seen look more beautiful than this, when it is lit up by the rays of the setting sun. There is a variety and a warmth of colouring, and a grandeur of outline about its rocky masses, which have at certain times seemed to me more striking than some of the finest snow-covered summits.

Behind St. Moritz, to the NW., rises the Piz Nair, a mountain very easily ascended; and continuous with this, towards Samaden, rise the neighbouring summits of Piz Padella and Piz Ot. In the opposite directions, towards Campfer, is seen the triangular pyramidal summit of the Piz Munteratsch, a mountain which rises on the eastern side of the Julier pass.

The village of St. Moritz itself is one of the dirtiest, the most untidy, the most irregularly and badly built in the whole valley; and I should say, from certain unsavoury smells which assail one in sundry quarters, very badly drained. If the whole of the older part of the village could, on some warm summer night, be conveniently burnt down, as the town of Glarus was in 1861, it would, I imagine, be an advantage to everybody. A few decent-looking houses have lately been built on the outskirts of the village for the accommodation of visitors, and a new and pretty little Catholic church, with a house adjoining for the priests, has recently been erected just beyond the Kulm Hôtel, on the road towards Samaden. Speaking of churches, I ought to mention that an English church is to be built at St. Moritz. The site selected for this purpose, and

liberally presented by Herr Badrutt, is an excellent one, by the side of the lake and about midway between the village and the Kurhaus. The foundation-stone was laid by the Archbishop of York so long ago as the season of 1868, and a considerable sum of money has been subscribed towards the building. Strange to say, no progress whatever had been made last season in the work of construction. Many subscribers to the new church are justly dissatisfied with the apparent apathy and indecision manifested by some of the promoters of this undertaking. It is to be hoped that another season will not be allowed to pass without making some very decided advance in the erection of the building, as there can be no reasonable excuse for further delay, and the want of church accommodation is year by year becoming increasingly felt. The English church service is at present held in the *salon* of the Kurhaus in the morning, and in the Protestant church in the centre of the village in the afternoon. The room at the Kurhaus is often found inadequate for the accommodation of the numbers who attend the morning service, during the height of the season. The occasional hurried entrance of a waiter, forgetful that the *salon de danse* of the night before had been converted into the English church of the following morning, points to the desirableness of hastening the building of a permanent and exclusively ecclesiastical edifice for the use of the members of our Church.

The village church in which the afternoon service is held has the disadvantage of being furnished with the most uncomfortable seats that were ever devised for the punishment of the devout and long-suffering Protestant—good old Puritan seats, especially designed for mortifying the flesh. Unfortunately they exercise a somewhat deterrent effect on the English church-going population of St. Moritz. Last season English church service was held in several of the adjacent villages—at Pontresina, at Samaden, and at Silva Plana.

But to turn from matters general and ecclesiastical to matters medical.

Most of the visitors at St. Moritz come for the purpose of going through the 'cure' there. This consists in drinking the waters, and bathing in them.

With respect to the composition of these waters much misapprehension exists. There appears to prevail a general belief that they are strongly chalybeate. This is by no means the case. The amount of iron contained in these waters is

comparatively small, as will easily be seen by comparing them with other well-known chalybeate springs:—

	Carbonate of iron.
St. Moritz	0·25
Spa	0·37
Tunbridge	0·39
Pymont	0·42
Schwalbach	0·64
Orezza	0·80

It is here seen that even the Spa-water contains a larger proportion of iron than the strongest of the St. Moritz springs, while the Orezza water contains nearly four times as much. The water of the Orezza spring is also abundantly impregnated with carbonic acid, and, I believe, as it becomes better known, it will be largely used. The spring itself is unfortunately situated in the Island of Corsica, and on that account it is not likely to be much drunk at its source; it is, however, exported in considerable quantities, and has long been in general use in Paris; but I am not aware that it has as yet been prescribed to any extent by physicians in London.

The following is the detailed official analysis of the water from the two sources drunk at St. Moritz. There is also a third source, but that has not yet come into use for drinking. One of these is termed the 'Paracelsus,' and the other the 'alte Quelle.'

IN 1,000 GRAMMES.

Gaseous Constituents.

	Alte Quelle. Grammes.	Paracelsus. Grammes.
Carbonic acid	2·5485	2·5220
Nitrogen	0·0047	—
Oxygen	0·0015	—

Solid Constituents.

Carbonate of lime	1·0460	1·2832
„ magnesia	0·1911	0·2412
„ iron	0·0327	0·0454
„ manganese	0·0059	0·0059
„ soda	0·2694	0·2935
Chloride of sodium	0·0389	0·0404
Sulphate of soda	0·2723	0·3481
„ potash	0·0164	0·0205
Silica	0·0381	0·0495
Phosphoric acid	0·0004	0·0006
Alumina	0·0003	0·0004
Bromine, iodine, fluorine	traces	traces
Total of solid constituents	1·9113	2·3287

The water is strongly charged with carbonic acid, which makes it sparkling and pleasant to drink. It also has a distinctly chalybeate taste, and is of rather low temperature— 3.5° R. = about 40° Fahrenheit.

A non-medical writer remarks of the St. Moritz waters : *—
'They are delicious—far too nice for medicine, though they are said to perform great cures. They combine the finest flavour of the best soda and seltzer water, iced. There is a keen, refreshing edge to them which spreads all over your being, and sharpens you up at once.'

Practically these waters may be regarded as containing a small quantity of iron, about three grains of the carbonate in a gallon of the stronger source, and a considerable amount of carbonate of lime, about eighty grains in a gallon, held in solution by an abundance of carbonic acid.

I am satisfied, from my own personal observation, and for reasons which I shall presently state, that the presence of this large amount of carbonate of lime, in the absence of any appreciable amount of aperient saline constituents, renders this water ill-suited to many cases where the use of a chalybeate is indicated.

The history of these mineral springs is of most respectable antiquity, although their celebrity in our own country is of quite recent date.

Thirteen years ago, an English clergyman staying at Schwalbach, heard of the existence of a very similar spring at St. Moritz, and wishing to exchange the somewhat sultry atmosphere of the former place for the more bracing influence of mountain air, came for the first time into this now popular watering-place, and found only two English people there ; and, indeed, so far as our own countrymen were concerned, it was at that time practically unknown as a health resort.

Germans, Swiss, Italians, and even French, had long known of the virtues of its waters or of its mountain air, or of both together, and annually came in considerable numbers to go through the regulation cure ; but it is only within the last four or five years that the place has been at all well-known to English physicians. Mrs. Freshfield's charming little book, entitled 'A Summer Tour in the Grisons, and in the Italian Valleys of the Bernina,' which was published in 1862, also did much to draw the attention of English tourists to the, at that time, unfrequented upper valley of the Inn.

* The author of *The Regular Swiss Round*.

It would seem, from recent discoveries, that the Romans were acquainted with these springs, and made use of them during their occupation of the country; but the earliest written account of them belongs to the sixteenth century. In the year 1539, Theophrastus Paracelsus, a physician of Hohenheim, wrote thus:—‘*Ein acetosum fontale, das ich für alle, so inn Europa erfahren hab, preiss, ist im Engadin zu Sanct Mauritz, derselbig lauft im Augusto am sauristen; der desselbigen Trankes trinket, wie einer Arztnei gebürt, der kann von Gesundheit sagen.*’ Paracelsus is, in consequence, held in great honour at St. Moritz, and the principal well is named after him. Since 1680 the waters have been exported, and so long ago as 1703 the springs were frequented by Germans, Italians, and Swiss. At one time the waters were collected in the hollowed-out trunk of a huge larch-tree, which was discovered during the excavations made in 1852 for the purpose of cleaning out and utilizing the new source, and improving the supply from the old one. The workmen were not a little astonished to come upon a great wooden tube, which further exploration proved to be formed of the trunk of a larch-tree artificially hollowed out. This was evidently the ancient conduit of the mineral source.

It was cleared of the earth and rubbish with which it had become filled, and the explorers were delighted to perceive that the clear and sparkling mineral water gushed forth in nearly ten times its former quantity, and of purer quality; since the ancient conduit had served, and had been doubtless designed especially, for the purpose of protecting it from contamination and dilution by the common surface-water.

About fifty years ago (1817) there was only a little pavilion or shed built immediately over the spring, and there was no kind of shelter provided for the drinkers. Three little ‘Trink halles’ were subsequently built, and these lasted up to the year 1832. In that year a sort of ‘Établissement des Bains’ was built, consisting of baths and a drinking-house with a few bed-rooms—simply, however, for resting in, after taking the baths. At this time, all the patients lived at St. Moritz, and had to take a twenty-minutes’ walk before they reached the baths.

In 1854 a company hired the spring of the commune for fifty years, on the condition that they should build a large bath establishment with a dwelling and boarding-house in the immediate neighbourhood of the spring. This building,

commenced in 1854, was finished in 1859; and in 1866 the large and convenient Trinkhalle, which extends from the Alte Quelle to the Paracelsus Quelle, was added. There is accommodation in the Kurhaus for about 300 guests; the bedrooms are many of them very small and inconvenient, but there are spacious and comfortable apartments for those who can afford to pay a high price for them. The dining-room is very large and handsome, and capable of seating 300 persons. There are also *salons*, and reading, coffee, billiard and smoking rooms. Notwithstanding all these advantages, the Kurhaus will never prove attractive to English people.

A twenty-minutes' walk from the village to the springs does not appear so formidable a matter to our energetic fellow-countrymen as it does to the Italian, German, and French visitors. Those, for the most part, inhabit the Kurhaus; while the English affect Herr Badrutt's establishment at the Kulm, not admiring the site in which the former building is placed, in the midst of low swampy meadows.

I warn my readers that I am now about to become profoundly medical.

St. Moritz is a watering-place of such recent growth, so far as our own country people are concerned, that even at the present time much doubt and misconception exists amongst English physicians as to the precise character of the illnesses in which the 'cure' at St. Moritz may most appropriately be recommended. Our difficulties were further increased by the reception of most conflicting accounts from different patients who had been sent there. Some returned assuring us that, of all places in the world, St. Moritz was the most delightful, the most invigorating, and health-restoring they had ever known.

Others gave a most gloomy account of it: they came back no better, or even worse, than when they departed; they had shivered all through August, they were never warm except in their beds, they had been nearly starved for want of decent food, and they had been bored to death by the unutterable dulness of the place. How were these conflicting reports to be reconciled? Of course, it immediately occurred to one that there had probably been some want of discrimination in the selection of the cases which were sent to St. Moritz. I determined, therefore, as the best and only way of resolving satisfactorily one's doubts and misconceptions on this point, to occupy the leisure of my autumn vacation in the investiga-

tion of the curative influence of this Alpine health resort, on the spot. I was perfectly familiar with the views of the Swiss physicians on the subject, but I desired that my own opinion should be founded on my own personal observation, and that it should not be a mere reflection of theirs: surely a not unnatural desire, yet one which has brought upon me some adverse and angry criticism. Fortunately for my object, but unfortunately, perhaps, for those who were vaunting St. Moritz indiscriminately as the universal remedy for everything, I had very ample opportunity of observing the effect of the climate and of the 'curing' process on various forms of disease and varieties of constitution. My notes refer to nearly fifty cases of illness which came under my own personal observation during my stay at St. Moritz.

But before I proceed to state the conclusion which I arrived at, I will quote briefly the opinions of the Swiss medical men as to the nature of the cases in which a residence at St. Moritz is likely to be beneficial or otherwise, as well as the method of drinking and bathing which they prescribe.

In the first place, conditions of general debility are mentioned, whether arising from constitutional tendency, or from over-work, or from attacks of exhausting diseases; and especially those debilitated states which often follow repeated miscarriages, or rapid child-bearing, or hæmorrhage or exhausting discharges of any kind.

In cases of slow recovery from the effects of typhus and intermittent or malarious fevers. In certain cases of delicacy of the skin, with a disposition to take cold, to rheumatic affections, and to exhausting perspirations.

In chlorosis of young people and in anæmia generally—that is to say, in all cases of blood degeneration—and especially in those cases of chlorosis which are accompanied with cardialgia (heartburn). When there is great irritability of the stomach, with a tendency to eructations, it is recommended that the water should be mixed with whey.

In chlorosis associated with nervous irritability—a most distressing and unfortunately common condition—in addition to drinking the waters, the cool carbonic acid baths are said to be especially calmative. The anæmia which follows as a result of repeated hæmorrhage during or after childbirth, or from too frequent or too excessive menstruation, is treated successfully by the waters and baths combined.

Nervous affections, associated with weakness of the circulat-

ing organs, or with general debility, of which the following are especially named:—Migraine, pain in the eyes, palpitations, uterine neuralgia, hypochondriacal conditions.

Certain states of weakness of the generative system, when unconnected with disease or injury of the spinal cord. Such cases improve greatly at St. Moritz.

Many derangements of the digestive organs, cardialgia, slighter forms of chronic gastric catarrh, the atony left after vomiting of blood, when all inflammatory conditions have passed away.

In hæmorrhoids, when considerable loss of blood has led to great exhaustion, and when they are unconnected with any organic disease.

Diseases of the female generative organs, especially the atonic conditions depending on irregularity of the menstrual functions, uterine catarrh, &c.

In vesical catarrh, worms, atonic gout, scrofula.

In convalescence after all severe diseases.

Such are the numerous and various disordered conditions which the Swiss physicians state will be benefited by a sojourn at St. Moritz and by taking the waters there.

They also mention certain diseases in which this 'cure' is counter-indicated. They are—Convulsive, nervous disorders in plethoric and vigorous constitutions, excitability of pulse and disposition to general plethora, frequent throbbings in the breast and head, threatened apoplexy, hæmoptysis, organic diseases of the heart, tendencies to active hæmorrhage, all forms of cancer, epilepsy, and violent hysterical conditions in plethoric persons.

The routine of drinking and bathing prescribed by the physicians of the place begins between six and seven in the morning. At this early hour groups of promenaders, wrapped up warmly, and braving the chilly morning air, are to be seen briskly pacing up and down the gravel paths in the ornamental ground in front of the Kurhaus. A select band of instrumentalists—the so-called 'Kurmusik'—endeavour with feeble strains to enliven the monotony of the occupation.

Ever and anon the promenaders disappear into the trink-halle to take their dose of water. This is a convenient building, in which the waters are dispensed. A boy stands at a pump, and pumps up the water as it is required. On the walls of the pump-room are racks of pigeon-holes, containing the glasses of the patients, and to each pigeon-hole the name of

the drinker is affixed. Near the pump-room you ascend by a few steps to a covered promenade, surrounded with comfortable lounges, and provided with reading and work tables. There are also several stalls for fancy articles on one side of this covered space. Those who are ordered to drink from the weaker 'alte Quelle' have to carry their glasses with them to the end of a long corridor, where the water of this well is pumped up in a similar manner.

A fee of twelve francs has to be paid on inscribing one's name on the Kurliste, two francs of which go towards the maintenance of the Kurmusik.

Patients are ordered to begin with one or two glasses, and increase to four or six glasses daily, and to walk for a quarter or half an hour after each glass.

Later in the day, generally after breakfast, the baths are taken. These are regarded as an essential part of the cure, and a course of twenty-five baths is said to be necessary in order to give them a fair chance. The baths are heated by jets of steam, which pour through two perforated pipes into the baths. By this means the water can be heated to a considerable degree without any loss of carbonic acid or precipitation of oxide of iron. By this arrangement, too, a great number of bathers can be furnished with baths at the same time. If hot water simply were added, the carbonic acid would escape rapidly, and the iron would be precipitated. A threefold system of pipes leads into each bath, one for the conveyance of steam, one for the mineral water, and a third for common water, for the purpose of cleansing the baths. They are generally ordered to be taken at a temperature of 26° R. at the commencement, and gradually reduced to 21°, or even lower. Twenty minutes to half an hour is the time for remaining in the bath.

The water supplied in the baths is derived from the weaker spring, the 'alte Quelle,' the 'Paracelsus' or 'neue Quelle' being the one more generally used for drinking. But, owing to the small supply of water compared with the number of bathers, the water of the spring is considerably diluted before it reaches the baths. The baths themselves are also constructed with the view of economising the supply of water as much as possible. They are simply long and narrow wooden boxes, just large enough to receive the body of the bathers. An unusually stout and tall man would find himself straitened for room in one. These boxes are covered in by a movable

lid, which fits round the neck of the patient, so that one's head appears outside the box while all the rest of one's body is shut in. This, it will be perceived, has somewhat the effect of a modified pillory, and could one be observed, while thus disporting oneself, by some of the small boys of the London streets, it seems not improbable that one might be made the subject of rude remarks.

The bathers are accommodated in small wooden compartments, separated from one another by wooden partitions, and arranged on each side of a long corridor. As the steam by which the baths are heated is allowed to escape freely into these corridors, they constantly become filled with a moist, hot, close, and unwholesome atmosphere, to remain in which for more than half an hour must be very injurious to most delicate persons, especially as they enter from and pass out into a thin dry air, often *very many* degrees lower in temperature than the air of the bath-rooms.

Let me now proceed to make what I trust I may be permitted to call a rational inquiry into the physiological and therapeutic action of these waters, when drunk and when used for bathing purposes.

The effect of immersion in water, charged with carbonic acid, a few degrees below the temperature of the body, is not disagreeable. The heat of the surface of the body sets free the carbonic acid of the layer of water in immediate contact with it. This accumulates on the surface in minute bubbles, so that the whole of the skin from head to foot, as well as every little hair, becomes covered with sparkling beads of gas. As the temperature of the layer of water in contact with the body rises (and, in order to favour this, one is particularly cautioned not to move in the bath, but to remain perfectly still), the bubbles of gas expand, and at last part from the skin, and escape at the surface of the water. As each little bubble of gas is set free from the skin it imparts to it a slight tingling effect, comparable only to the effect of an intensely feeble galvanic current; and doubtless its effect on the surface is of this nature. The result is that the skin becomes red and congested. If the bubbles of gas be swept off the skin, they do not reappear. The question is—Can these baths have an active curative influence? Or are they, as some suggest, ordered for the purpose of filling up the time of the patients, and also as a source of profit, since a franc and a half has to

be paid for each bath? That they can do *harm*, I have abundant evidence, as I shall presently show.

There are, however, cases in which these baths have a peculiarly soothing effect, since there can be very little doubt that prolonged immersion in warm water, rendered somewhat astringent by earthy matters held in solution, exerts an extremely calming influence in cases of exalted sensibility and nervous irritation; while, in other cases, the stimulating effect of the carbonic acid on the skin is not without a beneficial influence.

Some persons state that the effect of these baths upon them is to produce a state of intense exhilaration and excitement. But then these are persons of highly excitable nervous temperament—persons susceptible to the influence of electro-biology, and upon whom a few mesmeric passes will produce marvellous effects. The testimony of such persons of nervous and excitable temperament, given as it may be with the most perfect honesty of intention, has to be received, as every practical physician is aware, with great caution. To me the effect of the bath seemed scarcely appreciable. The feeling was agreeable, and one's skin became red, but the exhilarating effect certainly did not surpass, probably scarcely equalled, that of one's ordinary cold sponge-bath at home.

But if the good these baths do be in many cases problematical, the harm they occasion in some instances is by no means doubtful.

The mere fatigue which the taking these baths occasions in some cases of great general debility and exhaustion, and the lowering effect on a very weak circulation of remaining for so long a time as twenty or thirty minutes in a bath of any temperature, as well as the breathing, at the same time, the hot steaming atmosphere of the bath-rooms, produce, in many instances, as I had occasion often to observe, a low feverish condition, which it has taken some time to recover from. Especially is this the case in persons advanced in years, who come out of the bath exhausted, chilled, and uncomfortable, and then walk slowly, or perhaps are driven, through an unusually cold air; for it would not matter so much if the baths were taken only on warm fine days—but such days, in a bad season, are ‘few and far between,’ and the baths are taken daily. I say nothing of the absorption of iron by the skin, which, indeed, is not deserving of serious inquiry.

Next, as to the routine of water-drinking. It may

doubtless be very wholesome for persons who suffer only from imaginary illnesses, or for those who simply have to shake off the effects of the unwholesome excitement of the habitual life of our large European capitals, or for those habitual dyspeptics to whom an entire revolution in their mode of existence serves as a useful alterative,—it may be very well for all such persons to be made to get up at 6 o'clock in the morning, and drink three or four or more glasses of cold water before breakfast, with free exercise in the open air. But to many cases of real illness which are sent here, such a *régime* is absolutely hurtful. There is, doubtless, a tendency in these watering-places to treat all cases alike; whereas, my own experience pointed out, in the most forcible manner, the necessity of great discrimination in the course to be prescribed for different cases.

To most persons of languid circulation, with a deficient blood supply, and with greatly reduced muscular power, either on account of slow recovery from severe illness, or from depressing chronic ailments or exhausting discharges, the effect of a cold douche to the stomach, before any food has been taken, will very constantly interfere with the digestive process for the rest of the day, and give rise to distressing feelings of weight and flatulence in the stomach, as well as troublesome headaches. These are common consequences of the practice of drinking the waters in the early morning. I need scarcely observe, that there are many other conditions in which this process proves refreshing and invigorating. I am only pointing out the absolute necessity of classifying and discriminating different cases of illness.

Patients who have suffered in the way I have just pointed out, have been told by the local physicians to take the water slightly warmed, in order that some of the carbonic acid may be dissipated, the excess of which, they say, is the cause of the headache. I cannot agree with this statement; because precisely similar feelings of discomfort follow the drinking of water of the same low temperature and at the same period of the day, even though it contain little or no carbonic acid.

The real explanation of these symptoms is doubtless to be found in the shock which the repeated ingestion of cold fluid gives, in systems, be it remembered, not prone to vigorous reaction, to the branches of the pneumogastric nerves distributed to the stomach, as well as to the great sympathetic ganglia and their ramifications, which are placed in the immediate vicinity of this organ.

It appeared to me that I was able to make out one point very clearly by observing the cases that came under my notice there on the spot: it was, that persons with feeble and impaired digestive powers, associated with a weak circulation, and especially when these conditions were due to chronic, functional, or organic diseases, could not drink a quantity of cold fluid before breakfast, or remain for a *prolonged* period in baths of any kind, without experiencing considerable augmentation of the distressing symptoms from which they suffer; and, indeed, it was very singular that they should ever have been recommended to attempt any such rigorous process of treatment.

I have seen patients at St. Moritz so utterly fatigued and exhausted by the early rising, and the drinking and bathing which followed, as to be quite incapable of any further exertion for the rest of the day. Moreover, it is no new observation, that repeated immersion in baths for longer than a few minutes at a time has a very enervating influence in many conditions of general debility; and repeated confirmations of this experience came under my observation at St. Moritz. On the other hand, in conditions of nervous excitement or irritability, the baths doubtless have a soothing effect; but even in such cases it is questionable whether they should be long persevered in. As to the suggestion that there is some particular reason why a certain fixed number of the baths should be taken, be it eighteen, or five-and-twenty, or any other number, greater or less, there is only one English word that I know of to apply to it: it is the expressive, though somewhat indefinable term, 'humbug.' Yet it is curious to consider that this tendency to believe in the efficacy of repeating a process a particular number of times is deeply rooted in the human mind. It is one of the lingering remnants of the ancient and popular belief in magic, witchcraft, astrology, and the like. 'Go and wash in Jordan *seven* times' was the direction of the prophet to the leper, and how much more imposing does this sound than the simple injunction 'go and wash in Jordan.'

It was remarkable to me to observe the heroic perseverance with which some persons pursued the *régime* they had been directed to follow, notwithstanding the irresistible conviction that they were losing and not gaining ground. But then they had come all the way from England on purpose! At length some became really ill; and then with what unmitigated satisfaction did they receive the injunction to leave off bathing and drinking, especially the early morning draught! The very

immediate improvement in health, which I observed to follow in so many instances the giving up the bathing and drinking, leaves no manner of doubt in my own mind that the *chief* health influence in the place is to be found in its pure, clear, bracing mountain air. I must not be understood to say that I think the bathing, and especially the drinking the water, useless; on the contrary, I believe them to be of great value in many instances: all I wish to insist upon is, that many, very many, persons are sent to St. Moritz, who would do much better without any of the waters and without any of the baths.

There are others, also, to whom the waters may be useful, but who are not strong enough to rise at the early hour of six, or to drink them before breakfast. For all such the hours of eleven and four are the best for drinking, and a third glass may be taken of the bottled waters before going to bed.

There are two methods of judging of the therapeutic action of the St. Moritz mineral springs. One is by a process of rational deduction from the known effects of the ingredients which enter into their composition. The other is by the direct observation of their effects on those who drink them. Both are valuable; but the former is necessarily the more exact of the two, since in the latter method the effects observed may be due to other causes than the employment of the waters, and notably to the influence of the mountain air, and the entire change in the habits of life of the patient.

I shall limit myself, then, at present to the inquiry as to the probable physiological action of these waters on the human economy. It is not unimportant, in the first place, to consider what the effect may be of drinking daily a large quantity of water simply, apart from the mineral substances which it holds in solution, especially in the cases of persons unaccustomed to the use of pure water as a common beverage. This is a part of the inquiry very commonly omitted, yet it cannot be doubted for a moment that the admission of from one to two pints of an influential physical agent like water into the alimentary canal every day, in opposition to ordinary habit, must have a very decided influence on the health of the body. Let us imagine, for instance, a typical alderman, or a chairman of a city company, or even an ordinary diner-out of more moderate capacities; let us imagine, if we can, the amount of food and drink, of turtle, salmon, whitebait, venison, champagne, burgundy, sherry, port, hock, &c., &c., &c., in excess of the requirements of their bodies,

in actual hurtful excess, taken by such a person between Christmas and Midsummer of every year. . Conceive the residua of all these excesses lurking about the human body, in the blood, in the secretory organs, in the crypts and corners of the alimentary tube ; and consider also how little pure water has found its way along the same channel during the same period. And yet it is necessary to perfect health, that the interior of our bodies should be washed and made clean, as well as the exterior.

Put such a person on a daily dose of a pint and a half of pure water, for three weeks or a month ; restrict him at the same time to a moderate and limited supply of food, and make him take plenty of active exercise in the open air ; the effect will assuredly be to eliminate from the body, from the alimentary canal ; from the blood, through the secretory organs ; a certain amount of waste or hurtful material, the retention of which in the body might prove in time provocative of chronic functional derangement, or even of organic disease.

The necessity for an occasional course of this kind applies to most persons, except the most abstemious and self-denying. In the course of a year the blood may well get somewhat tainted with the products of impure food and faulty digestion, and the alimentary canal may also be the better for a little flushing to clear away the accumulated *débris*, which its ordinary action has not removed ; and the blood will itself be purified by the continued absorption and elimination of a considerable quantity of an important solvent like water. Water is rapidly absorbed into the blood, and also rapidly discharged from it. In its rapid passage through the blood and the tissues of the glands by which it is finally thrown off, it will carry away, dissolved in it, substances which were harmful to the economy, and which only needed an excess of this solvent in order to be eliminated by the channels of excretion.

But when the water that is drunk contains saline aperient salts, then its depurative action is more remarkable. In that case we have the advantage not only of the solvent action of the water, but also of the stimulating action of the compounds it contains on the organs of elimination, and especially on the glands of the alimentary mucous membrane. It is for this reason that we send those, whom we know to have lived freely, to flush their alimentary canals, their main drainage-tubes, as it were, at such springs as those of Carlsbad, Homburg, or Tarasp. The most satisfactory results constantly follow this

cleansing process. I suppose it has rarely occurred to anyone to connect very intimately the action of purgatives with the flow of poetic fancy, and yet, if the testimony of poets such as Dryden and Byron is to be accepted, the relation between them is not so very remote. Old Dryden adopted a method of spurring his Pegasus, not, I fancy, much in vogue with modern poets. He says, 'When I have a grand design, I ever take physic and let blood; for when you would have pure swiftness of thought and fiery flights of fancy, you must have a care of the pensive part; in fine, you must purge the belly.' Lord Byron's experience appears to agree with that of Dryden. His lordship observes, 'The thing that gives me the highest spirits (it seems absurd, but true) is a dose of salts; but one can't take them like champagne.' And we have far more ancient testimony to the same effect. We are told that 'Carneades, one of the most famous disputants of antiquity, was accustomed to take a copious dose of white hellebore, a great aperient, as a preparation to refute the dogmas of the Stoics.'

There is, therefore, one consideration common to all the springs at which we send our patients to drink, and that is the quantity of water we thereby induce them to consume. In those cases where we desire also to exert some stimulating effect on the secretory organs generally, and especially on the liver, and on the intestinal mucous membrane, we certainly ought not to prescribe a course of the St. Moritz springs, and for the following reason. The St. Moritz water is constipating, terribly constipating to some persons, and it has this effect in virtue of the very (comparatively) large amount of chalk which it contains—nearly ten grains to the pint. Many other mineral springs contain as much chalk as those of St. Moritz, but then very many of them contain also a considerable quantity of aperient salts, which counteract and overcome the constipating effect of the carbonate of lime, which then acts beneficially as a simple antacid.

The only secretion which the St. Moritz water increases is that of the kidneys, which of course *must* be increased by the ingestion of a large quantity of fluid, none of which passes off by the bowels. It is on account of this tendency of the St. Moritz waters to check the secretions, especially those of the liver and the intestinal canal, that persons suffering from chronic hepatic congestion, from obstinate constipation, and from visceral obstructions generally, are often made excessively

uncomfortable when they attempt to follow the course prescribed there. The dryness of the mouth and throat complained of by some while drinking these waters is referrible to the same cause. On the other hand, this astringent and bracing constituent proves of considerable use in cases of a different type; this is especially observable in those persons whom we designate as of leuco-phlegmatic temperament; pale, lax-fibred, languid people who commonly suffer from relaxed mucous membranes, chronic mucous discharges, and sometimes from passive hæmorrhages; a tendency to constipation may also exist in such cases, but then it is due rather to atony of the muscular fibre of the alimentary canal than to a deficiency of secretion. Women of this temperament constantly suffer from functional uterine disorders, and such cases, above all others, prosper at St. Moritz.

Cases of chronic diarrhœa, not of a dysenteric character, but rather dependent on an irritable condition of the intestinal mucous membrane, and often associated with excitability of the nervous system, are treated successfully by these waters. The abundance of carbonic acid in the St. Moritz springs is doubtless advantageous. There need be no great mystery however, as to its action. Water charged artificially or naturally with carbonic acid, forms the commonest of beverages throughout Europe. Such waters are grateful to the palate, and refreshing and invigorating to the system generally. In irritable conditions of the gastric mucous membrane they act as a sedative to that organ; we can therefore readily believe that cases of gastric catarrh, with acid eructations, are relieved by drinking these waters, containing as they do the alkaline carbonate of lime and the sedative carbonic acid.

Carbonic acid acts also in an important manner as a solvent; it holds in solution the oxide of iron and the large quantity of lime in these waters; it promotes their absorption into the blood. This brings me to the consideration of the most important ingredient in the St. Moritz springs, viz. the iron. Here arise two practical questions; first, why is iron so essential to us? and secondly, why do we go all the way to St. Moritz for it? To answer the first question is very easy, but it is not quite so easy to answer the second.

It has long been known that when persons become pale, from loss of blood or other causes, their natural colour may often be restored by the administration of medicines contain-

ing compounds of iron, or even the metal itself reduced to fine powder. This is the observed fact; now for the reason. The blood is the nutritive fluid of the body. It forms countless streams of liquid living food, which flows through nearly every tissue of the body. The precise manner in which the food passes from the blood into the tissues of the body and becomes incorporated with them is not clearly known to us. But the blood not only conveys nutrient matter to the tissues of the body; it serves also as the medium for the conveyance away, from the tissues, of the substances formed by their decay and disintegration—a process which is continually going on. Every one of the finest bloodvessels of the body not only brings a supply of food to the portion of tissue which surrounds it, but it acts also as a minute drainage pipe to carry off the waste products of the life and activity of that particular portion of tissue. We can easily see from these considerations how essential it must be to the health of the body that the integrity of the blood should be maintained. It must neither be defective in quantity nor quality.

There are many circumstances, which I need not enumerate, but notably the direct loss of blood by hæmorrhage, that may have the effect of altering the quality and diminishing the quantity of that fluid. When this is the case, it becomes the duty of the physician to attempt to increase its quantity, and to restore its quality. One of the most important changes which the blood undergoes in the way of deterioration is the loss of a portion of what we call its *red corpuscles*—minute microscopic cell-like bodies, of which there have been calculated to be five millions in a cubic millimètre of human blood, and that rather more than ten millions of them would lie on a space one inch square. Now it would appear that these little red corpuscles are probably the instruments or agents of nutrition; that they are the busy workers in the blood, building-up and pulling-down with equal industry, while they themselves die and are replenished continually. Chemical examination shows that the metal iron is an essential constitution of red blood-corpuscles; and, therefore, a certain supply of iron is needed for their constant formation. For ordinary purposes we obtain a sufficient supply in our usual food, the flesh of animals, &c.; but when an extraordinary supply is required for the rapid manufacture of much-needed red corpuscles, then we have to give iron in the form of medicine. It is on this account that, in medical language, we call iron a blood restorative. In

those cases in which it is necessary, the demand for it is imperative, and nothing else can supply its place. That it acts by restoring the red blood-corpuscles we have abundant proof; in the first place, we constantly see the colour and freshness return to pale faces and blanched lips during its administration, and in the second place we have carefully examined the blood with the microscope in such cases. In less than a month the quantity of red corpuscles has been found to increase from 50 to 76 parts in 1,000 parts of blood, while the patient has been taking iron medicines. Yet the amount of iron in the whole body is but small. According to some physiologists, there are about 100 grains of metallic iron in a man weighing eleven stone. An affectionate Frenchman, having lost a friend to whom he was much attached (not his wife), caused the body to be burnt, and having extracted the iron from its ashes, converted it into a mourning ring, which he wore in memory of the dead!

Although there is only this small quantity of iron in the human body, we occasionally find great difficulty, notwithstanding all the varieties of iron medicine at our disposal, to induce the system to take up and appropriate any portion of that which we are constantly supplying it with. This brings me to the second question, viz. why do we send patients all the way to St. Moritz, to get a few additional grains of iron, when we can supply it so abundantly at home? The truth is, that in some instances the power of assimilating the ordinary compounds of iron appears to be absent, and we send patients to St. Moritz not for the sake of the iron in the water merely, but that they may recover the power of assimilating this substance. This object the mountain air and the active out-of-door life in many cases effect.

There is also another reason. Of all the compounds of iron, the carbonate of the protoxide, when held in solution by carbonic acid, is the one most easily assimilated, and it is in this form that iron exists in most mineral waters. I have already pointed out that the St. Moritz water is unsuited to some persons who require iron, on account of its constipating rather than aperient character, and it is a matter of the commonest experience that iron salts are useless, and produce discomfort in many cases, unless combined with laxatives. This is especially the case in *commencing* an iron course.

Now the mineral waters of Tarasp, some of the springs at Homburg, and in a minor degree those of Kissingen, supply

the combination of chalybeate and aperient; and it is for this reason that it is often advantageous to begin the iron course at a place like Homburg or Tarasp, and finish it at St. Moritz. It is also useful while drinking the waters at St. Moritz to take an occasional aperient in the form of a bottle of the Tarasp water or a seidlitz-powder, or some other simple medicine.

But the quantity of iron in the Paracelsus spring is so small—only about the third of a grain in a pint—that when any great deficiency of iron in the blood exists, a large quantity daily for a long time is needed to supply this; and I have already pointed out that in great debility of the digestive organs, so much fluid cannot be absorbed without considerable disturbance of the general health. In such cases I have administered, at St. Moritz, the ordinary iron preparations with great benefit. In this way one can give as much iron in a table-spoonful of fluid as is contained in a gallon of the water; and I have seen patients who have taken the waters and baths for two or three weeks without any benefit, or even with loss of strength, rapidly gain ground when put on this system. Ordinary iron medicines that at home would not be assimilated, are here readily taken up.

I must again remark that I am particularly anxious not to be understood as laying down general laws—that is quite impossible in an investigation of this kind; but I am endeavouring to make clear why it is that the St. Moritz course is so successful in some cases and so unsuccessful in others. To sum up: the cases that appear to derive most marked improvement from the waters and air of St. Moritz are that very numerous class of lax-fibred, leuco-phlegmatic, hysterical women, who commonly suffer from chronic mucous discharges, or passive hæmorrhages, or functional uterine disease. The improvement which is observed in some of these cases is rapid and remarkable. Cases of nervous irritability and nervous depression in both sexes, arising from over-work or over-excitement, or from merely constitutional tendency, often derive very considerable benefit from following the course prescribed for them there.

Cases of chlorosis and anæmia in young women, who fail to improve under chalybeate medicines at home; as well as those distressing nervous conditions which so commonly accompany the climacteric period of middle age are often very remarkably benefited by a short residence at St. Moritz.

The cases which do not do well there are those of the sanguine and bilious temperament. The very dry and stimulating air and the astringency of the waters are not favourable to such persons. In cases of hepatic derangement, the waters of St. Moritz generally do harm, since they tend to arrest rather than promote secretion.

Cases in which there is a tendency to pulmonary emphysema are not adapted to this great altitude. The air seems too thin, as it were, to satisfy their respiratory requirements, and they are consequently unable to make as much physical exertion there as they could in a less rarefied atmosphere.

For the same reason feeble persons, advanced in years, very commonly become worse there, and immediately mend when they begin to descend into the lower valleys. Of this fact I have seen several instances.

I have yet to speak of St. Moritz from a purely climatological point of view, and this is a most important part of the subject. The general question of the influence, beneficial or injurious, of the climates of different parts of the world on healthy or diseased human beings, is one of the greatest interest to the practical physician. It is one, also, in which the welfare of the general public is very intimately concerned. Many valuable lives have been prolonged by a wise and judicious removal from the action of climates which were clearly imperilling their existence; and, unfortunately, it must also be admitted that many valuable lives have been lost by ignorant and injudicious transference to climates which were proved, too late, to be utterly unfitted for them.

The question, then, of a cure by climate is one which constantly arises in medical practice, and it is often the only one which leaves any hope of success. It is of the greatest moment, therefore, in every case, that one's decisions on this subject should be founded on extensive and accurate information, and that they should not assume a positive or dogmatic tone, until, by prolonged and unbiassed investigation, a sound basis of facts and experience has been provided for them.

The investigation, however, of the beneficial influences of the different places that have been put forward as 'climate cures,' is by no means free from difficulties; and not the least of these is found in the unfortunate but unavoidable circumstance, that the personal interests of a great number of individuals become more or less intimately associated with the success or non-success of the localities in question. So that

we must always be prepared to meet with a certain amount of exaggeration on the one hand, and a certain amount of concealment on the other. We are further constantly embarrassed by the over-brilliant descriptions of the constitutionally enthusiastic, as well as by the dismal accounts of the constitutionally discontented. For my own part, and with regard to the Upper Engadine, I believe that, as a summer health-resort, we possess now sufficient experience to form a decided opinion as to the cases in which it is likely to be of advantage; but, as a *winter* residence, I feel that it would be quite unjustifiable, with the very small amount of experience that we have hitherto been able to obtain of its influence on Europeans generally, to give a positive opinion one way or the other.

All observers agree that one of the chief characteristics of the climate of the Upper Engadine is very sudden and great diurnal variations of temperature. The thermometric-variations in the same day are often so very considerable, that in summer a temperature below freezing-point will be registered, and on the same day a temperature of from 40° to 50° above freezing-point; while a westerly wind in the winter will cause the thermometer to mount from -13° F. to $+42^{\circ}$ F., a range of 55° . These sudden changes are admitted by the resident physicians, to produce even in the acclimatised attacks of inflammation of the lungs, of pleurisy, of chronic rheumatism, and of catarrhal fever.

The mornings are generally cold and damp, as there is a strong dew-fall, but the damp fogs which are common in the lower Swiss valleys are almost unknown at these great elevations. The mid-day is often very hot, as the sun's rays act very powerfully, owing to the perfect clearness of the sky and the thinness and purity of the air. The evenings again are cold. On some few nights in the height of summer, when the south wind comes over the mountain-passes from the plains of Italy, the air becomes positively warm.

I remember one evening last August (the 23rd) we picnic'd on the hill-side between St. Moritz and Campfer till eight o'clock in the evening, and afterwards basked in the beautiful moonlight on the terrace of the hotel until after midnight. Inconceivably gorgeous are these still summer moonlit nights in the Upper Engadine.

Speaking generally, there is in the Engadine a short and temperate summer, and a long and very cold winter. Judging

from my own experience of last August, I should say that those who have never visited this valley, or who have only spent a day or two in passing through it, form an exaggerated idea of its coldness in summer. I know at least one lady, who was more or less of an invalid, and who passed some portion of nearly every day of last July and August reclining on a couch in the open air, on one or other of the terraces of the Kulm Hôtel. Of course on many days in order to do this it was necessary to wrap up warmly.

From a series of meteorological observations, continued over many years, at Bevers, near Samaden, by M. Krättli, the following facts have been taken :—

The mean annual temperature of the Upper Engadine is $36\cdot5^{\circ}\text{F}^{\circ}$. The mean for the three summer months of June, July, and August, $50\cdot8^{\circ}\text{F}.$; for the three winter months of December, January, and February, $17\cdot5^{\circ}\text{F}.$; for the three months of spring, March, April, and May, $35\cdot4^{\circ}\text{F}.$; for the three months of autumn, September, October, and November, $37\cdot8^{\circ}\text{F}.$ The two extremes of temperature observed by M. Krättli (in 1854) were $-25\cdot8^{\circ}\text{F}.$, or $57\cdot8^{\circ}$ of frost in February, and $79\cdot7^{\circ}\text{F}.$ in July. In November and December, there are usually thick fogs, but the three first months of the year are generally calm and clear, and the sunsets and sunrises are said to be most magnificent.

For five months in the year, the snow covers the ground to the depth of two or three feet, and the lakes are covered with ice several feet in thickness; snow occasionally falls in summer. M. Binet Hentsch states, that he saw the valley white with snow on the 2nd of July, 1857, and that on the 3rd of August, 1858, he had broken ice on the banks of the Inn.

The extreme dryness of the air renders the cold in winter less insupportable than it otherwise would be. The normal barometric pressure is considerably diminished, owing to the greater rarity of the air at this elevation: it ranges between twenty-four and twenty-five inches.

The relative amount of ozone in the air is much increased.

St. Moritz is certainly more favourably situated than most of the other villages of the Upper Engadine; it is sheltered on the N. and N.W. by the Julier chain of mountains, and on the east by a wooded elevation which projects as a spur from the mountains at the back, and so forms the eastern boundary of the St. Moritzer See. The declivity upon which it is built has also a southern aspect; but the drawback to nearly the

whole of the Engadine is the great height and nearness of the mountains bounding it to the S., so that they intercept a great deal of the sun's light and heat.

Of the salubrity, then, of the climate of St. Moritz in summer and in fine weather, there can, I imagine, be no difference of opinion. The air is perfectly pure, clear, dry, and bracing. There is an absence of that oppressive heat, even in the hottest weather, which makes the lower valleys almost unendurable; for wherever there is shade in the Engadine there is also coolness. The freshness of the air, moreover, induces an increased capacity for muscular exertion, and the author of the 'Regular Swiss Round' mentions that he has known some people come there 'who have been so indisposed as to feel scarcely able to make the journey from London to Paris, and after a time have been able to make a twelve-hours' excursion on the glacier.'

This statement goes more to the root of the matter than the writer of it probably thought at the time he penned it. I believe this kind of climate especially useful to those who have been *strong*; but by some accident or other, such as over-work, or illness, or trouble, have become weak: to those who possess a latent power of reaction. I do not think it is so advantageous to the essentially weak person, to those to whom 'twelve hours on a glacier' always has been, is, and ever will be an utter impossibility. It is to such persons, I imagine, Dr. Williams alludes when he observes, speaking of this locality, 'some are chilled without being braced, and scorched by the sun without being permanently warmed. The excitement of the air causes fever instead of strength, restless nights and loss of appetite.'

For the same reason the Engadine does not suit persons advanced in years, unless they retain considerable bodily vigour. Show me an aged person whom the Engadine suits well, and I know there are such, and I should be disposed to conclude at once that he possessed a naturally vigorous constitution.

But much of the benefit that is derived from a short residence in an elevated region like that of the upper valley of the Inn is due, I conceive, to the *alterative* influence which it exercises on the human organism. 'Alterative' is a term we constantly have to use for want of a better one; we apply it to any agency which produces a change in, or 'alters,' by the way of improvement, the action of the bodily organs in a manner which we cannot otherwise explain. Now in passing

from the sea-level to an elevation of over 6,000 feet, we must *alter* in a very palpable manner the conditions of our lives. Our circulatory organs, our respiratory organs, our secretory organs are working under altered conditions and changed influences. This alterative action is, of course, assisted by the coincident change from possibly unwholesome to wholesome food, from weary hurtful work to refreshing rest, and from insufficient exercise to bodily activity.

It will be observed that I have said a *short residence*; by that I mean from three to eight weeks, and I think it undesirable, in many instances, to prolong a stay in the Engadine beyond this period. Most of the visitors to this Alpine valley do not wish to become acclimatised there. They have to return to the sea-level, and live there for the rest of the year. We know from experience that it is not wise to continue an alterative course of treatment too long, or repeat it too frequently, for either it will lose its effect altogether; or, worse, it may do harm.

The Swiss physicians have, I presume, observed this, as they recommend that, after three weeks, if it be deemed advisable to prolong the 'cure,' that the patient should go down into Italy or into the Tyrol for a short time, and return and complete the course subsequently. I doubt not that this is sound advice.

The experience of most of those who have passed several seasons consecutively at St. Moritz, has been that after their first season they have left immensely benefited; after their second season, considerably benefited, but less so than after their first; after their third season still benefited, but decreasingly so; and after their fourth or fifth season they have found themselves scarcely benefited at all.

The conclusion to be drawn from all this is, that you may place yourselves under very altered conditions of life, with advantage, for a time, but it is better not to continue to do so too long, or repeat it too often.

It is wiser, therefore, to go to St. Moritz every other year than every year, or to go for two years and remain away for two years. And yet it is quite possible that there may be persons to be heard of who obtain benefit from a visit to St. Moritz *every* year; for the human constitution most provokingly resists any attempt to make it universally conformable to general laws.

A prolonged residence at St. Moritz has, quite recently, been put forward as a cure for consumption of the lungs;

and from this point of view it is necessary to regard St. Moritz as a winter as well as a summer health-resort. But this is only a part of the wide general question, whether consumptive patients should or should not be sent to elevated situations. The evidence in favour of an affirmative answer to the general question is very strong, but the evidence in favour of the Upper Engadine or the neighbouring valley of Davos, as being especially adapted to these cases, is, it seems to me, remarkably weak.

Certainly all the evidence that has been collected on this subject goes to prove that immunity from phthisis does not follow any particular level of elevation. The mere amount of elevation must be eliminated from the discussion as a non-essential. The most strenuous advocates of the high-elevation plan of treatment, admit that the altitude of immunity from consumption varies in different latitudes, descending in proportion as we pass from the equator to the poles. In the tropics it seems necessary to ascend to an elevation of between 8,500 to 9,500 feet. In the Peruvian Andes, for instance, patients are sent to mountain valleys reaching an altitude of nearly 10,000 feet. In Mexico they ascend to valleys 6,500 and 7,000 feet above the sea-level. On the other hand, in the Pyrenees, we are assured that at elevations varying from 1,760 feet (Bagnères de Bigorre) to 4,580 feet (Gavarnie), phthisis is equally rare.

In Switzerland some localities not more than 3,000 feet above the sea appear as free from phthisis as others of twice that elevation. In the Black Forest and in the Harz mountains of Germany we are assured that consumption is extremely rare at the comparatively moderate height of 1,400 to 2,500 feet; while Dr. Brehmer asserts that in the neighbourhood of Görbersdorf, in Silesia (1,700 feet), he has never seen phthisis amongst the inhabitants.

These statements seem to point clearly to the conclusion that the freedom which any particular locality may appear to enjoy from serofulous disease is independent of its mere elevation, and due probably to other conditions. This view is further supported by the fact, that at Andermatt and at Splügen, each about 4,700 feet above the sea, phthisis is known to occur, while at Klosters, which is 700 feet lower, it is unknown.

Let me add another fact to the preceding. A voyage on board ship is one of the most effectual means we know of, without any exception, for arresting the progress of consump-

tion. What does this prove, but that the sea-level, under certain conditions, is as curative of phthisis as the highest elevations?

One of the conditions common to life on board ship, and to life in a high mountain valley, is the mechanical purity of the air that is breathed, and its entire freedom from organic admixture. We have heard much lately about 'dust and disease.' We know that the air of large densely-populated cities and towns is filled with impurities, both organic and inorganic, and doubtless in many localities these floating particles are largely composed of filthy putrescent organic substances: whether they are, in any true specific sense, 'disease germs' or not, is an open question. It is amongst those who have to live in the worst parts of this unwholesome town atmosphere that phthisis is most rife and fatal, and therefore to the absence of these impurities in the air of elevated regions, as well as in that of the open sea, we may reasonably attribute their beneficial influence in preventing or arresting tubercular disease.

Most of the localities which have been mentioned above as enjoying an immunity from scrofulous disease of the lungs, are characterised by a pure and dry atmosphere, a dry subsoil, and a scanty population.

It has been shown, quite recently, that where these conditions are found combined in certain favoured localities in our own country, the occurrence of cases of consumption is proportionately diminished; and there seems to be no reason why we should not be able to discover in North Wales, in Cumberland, or in the highlands of Scotland, places as well adapted for the residence of phthisical patients as the Swiss mountains.

I am not disposed to attach much importance to the statements made by medical men who reside in high *and very thinly populated* districts—such, for example, as the Upper Engadine or the Davos Valley—to the effect that cases of consumption are rarely observed there. These statements are, no doubt, perfectly true, but what is their value?

If consumption be a disease engendered by city life, by malaria, by over-crowding, by breathing a damp contaminated atmosphere, we should expect it to disappear in localities where all these conditions are reversed.

Suppose, for example, a medical man residing in a village of a few hundred inhabitants, situated on Dartmoor, were to

promulgate a statement to the effect that he had never known a fatal case of consumption to occur in a native of his village, and that when such cases had occurred they had been 'imported.' Should we be induced, by such a report, to send all consumptive patients to Dartmoor? I think not. We should assuredly remark, that his field of observation had been very limited, and the population under his care very small; that there were probably many other localities more conveniently situated, yet equally favoured in point of salubrity; and that it would be desirable to abide the result of more extended observation over a greater area, and over a larger population.

It may be interesting to inquire briefly into the nature of the evidence upon which reliance is placed to support the view that elevated districts are those best suited to phthisical patients.

The strongest and the most unequivocal is that derived from the experience of medical practitioners resident in the large towns at the base of the Peruvian Andes, and in other similar tropical stations.

In these localities consumption is very rife, and it has long been the established mode of treatment there to remove the patients so afflicted, as early as possible, to one or other of those sheltered valleys at great elevations, which the slopes of the Andes afford in abundance. Dr. Archibald Smith, of Lima, was one of the first to call the attention of the medical profession to this method of treatment. He stated the fact that in the Peruvian Andes immunity from phthisis was commonly observed at an elevation of between 7,500 and 8,500 feet. No plan of treatment could be more rational than to remove the consumptive patient from the hot, damp, reeking, malarious atmosphere of the densely-populated town, in which he had been attacked, to the pure, clear, dry, invigorating air of the adjacent mountain valleys. There is no need to marvel at the efficacy of such a process, nor does it afford any reasonable ground for assuming that, *in every part of the world*, very elevated mountain valleys are the best localities for the treatment of phthisical cases. It is very well known that, in temperate climates, some moderately elevated regions enjoy a greater immunity from tubercular disease than others of perhaps twice their altitude.

The evidence adduced in favour of the curative influence of a prolonged residence in the Upper Engadine, and at Davos, in phthisical cases, is not, to my thinking, very abundant,

or entirely unequivocal; and I must here protest against the absurdity of charging me, as has been done, with favouring an old-fashioned prejudice, because I choose to examine critically the evidence in question. At present I prefer the position of a critic to that of an advocate, as I hold it to be the honester course to let advocacy follow, and not precede, conviction.

We first, then, meet with the assertion that scrofulous disease is unknown amongst the natives of the Upper Engadine and of the Davos Valley; and that when the inhabitants of the lower districts of Switzerland become affected with scrofula, they are restored to health on migrating to these districts. We are further told, that although fatal cases of consumption have occurred there, the disease has invariably been imported.

But let us place against this statement another which is made on the authority of the medical men residing at these places, to the effect that deaths from inflammation of the lungs, from pleurisy, and from catarrhal fever are common; let us associate this with another fact, which is now generally admitted, namely, that consumption is a common sequel in our own country to these inflammatory affections; and we are then compelled to ask the question, would not many of these acute attacks which prove rapidly fatal in the Engadine have merged, in a warmer climate, into those chronic conditions which are never developed there because of the fatal severity of the primary disease?

But admitting, in its full significance, the fact that the natives of these localities are free from tubercular disease, it is met by another fact, viz. that such is also the case in many parts of Europe, at not more than half this elevation, where the population is sparse, and the atmosphere dry and pure. I have mentioned some such places, and there is every reason for believing that it would not be difficult to find many more.

Dr. Hermann Weber, whose name will always be associated with earnest efforts to place the treatment of consumption by climate on a sound and rational basis, has been at the pains to collect the particulars of several cases of chronic lung disease which have been treated by removal to elevated districts.

Of seventeen cases, the particulars of which Dr. Weber has published, quite one-half appears to have been foreigners, Swiss or Germans, who, having left their native villages, had migrated to London or some other great city, and there had

broken down with chest disease. Some of them returned to their native places ; one to the Black Forest (2,800 feet), another to a village in Switzerland (2,500 feet), another to the Ober-Alp (about 5,000 feet), and at these places they regained their health : two of them subsequently returned to this country and died. A fourth, a German, became ill in England, and improved by a long residence in Switzerland at an elevation of 3,000 feet.

Eight out of the seventeen recovered on removal to the high valleys of the Peruvian Andes and the Cordilleras. Three cases only are recorded as having passed a winter at Davos ; one of these, a German or a Swiss, I forget which, recovered there ; the second, a native of Livonia, improved greatly, and the third case, a lady, improved on first coming to reside at Davos, but was seized with influenza there in March, which led to chronic pneumonia, and *she was not free from cough and pyrexia when she left Davos in August.*

One case only is quoted as an example of what the climate of St. Moritz can do ; it is the case (which everyone who has visited St. Moritz of late years must have become acquainted with) of the son of the English chaplain there, who having suffered three attacks of hæmoptysis in London and Hastings, recovered from all symptoms of chest disease by wintering in the Upper Engadine.

With regard to this last case, I have to observe that hæmoptysis is now admitted to be rather a favourable symptom than otherwise in early tuberculosis of the lungs, and that similar recoveries are constantly made elsewhere than at St. Moritz.

We learn very little, then, from these cases concerning the Engadine ; but we learn *one very important fact*, viz. that a moderate elevation of from 1,500 to 3,000 feet is as useful in some parts of the world as an altitude of from 7,000 to 10,000 feet in others.

With regard to Davos, I have thus written of it in the ' Medical Times and Gazette ' of October 16, 1869 :—

' A far greater number of persons with pulmonary complaints have wintered of late years at Davos. This is situated in a valley running parallel with the Engadine, at a somewhat lower elevation, 5,105 feet above the sea. It is reached by diligence from the Landquart station, close to Ragatz, through the valley of the Prättigau, in about six hours. It is also connected by several mountain passes with the Engadine, one of which,

the Fluela Pass, is traversed daily by diligence. This also is about six hours' journey—i.e. from Sûs, in the Lower Engadine, to Davos Dorfli, in the Davos Valley. At the time of my visit to Davos I was informed that there were nearly 150 patients undergoing the "cure" there. Now, one would imagine that, with such a large number of resident patients, the detailed histories of a considerable number of well-marked instances of tubercular consumption which had been cured or arrested by the influence of mountain air might be obtained. But here again one is struck with the dearth of detailed information upon which one can rely—I mean upon which one can rely with a sufficient amount of confidence to induce one to send phthisical cases which come under one's own observation to this place.

'I have now before me a list of seventeen cases tabulated and appended to a pamphlet written by the resident physician at Davos, recommending that place as a "cure" for tubercular consumption. Now, of these seventeen cases—which, be it remembered, *have been selected for publication*—thirteen appear to have remained at Davos from July to September only, and during that time they all appear to have gained a few pounds in weight—from two to twenty. This is the only *fact* of any importance to be gathered from this table. Three of the cases are described as "catarrh of the apices," one of which was cured, and the other two "left better"!'

By writing thus I have had the misfortune to make the resident physician at Davos very angry, and I have been, in consequence, the subject and victim of a most coarse and personal letter from that gentleman, published in the 'Medical Times and Gazette' of April 9, 1870. It would be useless as well as extremely unpleasant to enter into a controversy with a person of such remarkable argumentative powers as the Davos physician, for he observes, 'Everyone will find me ready to discuss this question, and *to refute all arguments based on facts*' (*sic*)!!

But, as he complains of the comments I have made on his table, I may perhaps be permitted to reproduce it here entire.

This table refers to seventeen cases, selected, as Dr. Spengler admits, to prove that a high mountain valley is the right place for consumptive patients to *winter* in. Is it not remarkable, then, I ask, that thirteen of these *selected* cases never *wintered* there at all? But there are positively two cases included in the table, the particulars of which only refer to a residence of fourteen days—from July 10 to July 24! Why are they introduced? Dr. Spengler says, ‘Their residence here was in some way a measure of precaution, as hereditary predisposition had already made itself known.’

Are we indeed seriously requested to believe that a fortnight’s residence at Davos, in the middle of July, is a prophylactic against inherited phthisis? This is a little too severe a demand upon our credulity, even from a physician who ‘stands on the newest, scientifically established, pathologico-anatomical point of view,’ as Dr. Spengler modestly describes his position.

What I have to say about this table is, that, had it been in Dr. Spengler’s power to select cases which would have told more strongly in favour of his views than those alluded to therein, it is incredible that he should not have preferred to publish them. I am therefore compelled to believe that these seventeen cases are the most striking he can produce in support of his statements, and a very feeble support they give. Dr. Spengler states in his angry letter, that the proprietor of the Kurhans at Davos came ‘from Manchester for the sake of his wife’s health.’ Why was he not candid enough to add that this lady died at Davos? It would be interesting to us also to know whether any other deaths have occurred amongst the visitors there.

This Davos is a dull, dreary, monotonous mountain valley, and an American who had spent a winter in the place assured me that, ‘to save his life,’ he would not pass another there.

A gentleman who passed the winter of 1868–69 at St. Moritz, with two or three ladies, has made the following entry in the visitors’ book of Herr Badrutt’s Engadiner Kulm Hôtel:—

‘We spent five and a half months at Herr Badrutt’s, and feel ourselves much indebted to the great kindness of himself, his wife, and the whole family. They made our winter quarters so comfortable that we were loth to leave them when spring came. Any doubts we had entertained as to the possibility of keeping warm indoors in a locality where, in the open air, the

temperature was often below zero Fahr. in the shade, were speedily dispelled. Owing to the extreme dryness of the air, we never found our sitting-room comfortable above 56° Fahr., a temperature that would be unbearable (!) in winter in the more humid climate of England. The rooms are warmed by means of stoves, not open fire-places, consequently the chief difficulty is to ventilate them properly; to do this effectually, we left our sitting-room for five minutes every two hours, opening all the doors and windows. A pan of water kept on the stove is also indispensable to prevent the already dry air of St. Moritz becoming overdried. On an average, we were out four hours daily, walking, skating, sleighing, or sitting on the terrace reading, this latter two or three hours at a time; twice in January we dined on the terrace, and on other days had picnics in our sledges: far from finding it cold, the heat of the sun is so intense at times that sunshades were indispensable, one of the party even skating with one. The brilliancy of the sun, the blueness of the sky, and the clearness of the atmosphere quite surprised us. The lake affords the opportunity, to those who love the art, of skating without interruption for five months. The ice has, to a certain extent, to be artificially maintained. To do this, we, with other English friends, formed a small club—1st, for keeping a circle clear of snow; 2nd, for renewing the surface whenever it became impaired by turning a stream on to it.

‘I must state, having spent part of the winter of 1867–68 at Mentone, that I derived far more benefit from that of 1868–69 spent at St. Moritz. The change from England to Mentone did me good at first, but latterly I experienced great lassitude; whilst at St. Moritz I was far stronger at the end of the winter than at the commencement. During the whole time I had neither cold nor cough, though I was out all weathers. I give these health details in the hope that they may be useful to people who, like myself, have delicate lungs. . . .

‘There is always a great amount of ozone in the atmosphere, and without that damp which is necessary to its existence in a place where the winter is not severe. The daily mean of March is 18·47 (21 being the greatest possible amount). By the hygrometer the degree of moisture in the air is very rarely registered as high as 90, being frequently as low as 20. One or two days the sun-heat was remarkable, the thermometer reading 142° Fahr.; on the other hand, the

greatest cold was -18.5° Fahr.—viz. $50\frac{1}{2}^{\circ}$ below freezing point—during the night.

'We left St. Moritz for Lugano and Cadenabbia at the end of March, to escape any damp the spring thaw might create; but experience taught us that the uncertain spring weather of the plain causes far more injurious damp than the mere thawing of the snow at such a height as St. Moritz. There the disagreeable effect of a temporary and most unusual thaw in February (brought on by a warm wind and great sun-heat) appeared to be confined only to the melting of the snow on the roads and mountains, off which it ran as rapidly as it thawed, imparting no perceptible damp to the air. In the plain we had plenty of rain, snow, and mist, and on fine days it soon became too warm and relaxing. We thought to better ourselves by spending May on Monte Generoso, where there is a good well-managed hotel in a charming situation, about 4,000 feet S.M.; but that is too uncertain a month for this mountain. Although we have had some fine days, we have been most frequently in the midst of clouds, rains, or storms. The group of mountains of which Monte Generoso is the most southern seems to attract the clouds that rise from the vast Lombard plains, over which to the Apennines the view is unbroken. St. Moritz, being so much higher, is above the ordinary cloud level, and consequently gets less rain; most of the clouds, of which there are not a few in summer and autumn (I do not know it in spring), seem to be carried rapidly over the Engadine by strong currents of wind. May, we hear, has been drier in that district than here. I would recommend others to profit by our experience, and pass the whole spring at St. Moritz, or if they leave it, to do so only for a fortnight or so whilst the roads are disagreeable.'

This gentleman and others who have passed the winter at St. Moritz speak gratefully of the benefit they have derived from the attention and skill of the resident Swiss physician, Dr. Berry.

The following letter, copied from the 'Times' of February 21, 1870, and signed the 'President of the St. Moritz Skating Club,' I conclude, from internal evidence, emanates from the same enthusiastic gentleman:—'On a portion of the St. Moritz Lake, we are able to produce artificially a "beautiful surface." By proper appliances—viz. a sluice-gate and guiding-shoots—we divert the course of a stream on to the surface of the ice, having first surrounded that portion

marked out for the skating-ground with a low ridge of ice made of wet snow. This confines the water, which is allowed to flow on to the ice for a few minutes till the space is covered; the stream is then returned to its own channel, and runs, as before, under the ice into the lake. The ice measures some three feet in thickness.

‘Last winter, on January 24th, the *minimum* thermometer (not exposed to the sky) registered -18.5° Fahrenheit, i.e. $50\frac{1}{2}$ degrees of frost (to use the term Mr. G. S. Symons objects to); this season the lowest temperature has been -13° Fahrenheit on the 24th ult. The same night, at the Government Meteorological Station, a few miles distant, it was -19.3° Fahrenheit. The January thermometer mean is 16.31° , that of the *minimum* 5.56° . From the 10th of October the *minimum* was continuously below freezing point, on the 29th falling as low as 1° Fahrenheit. Our skating commenced October 25th, and will probably continue till the end of March or April.

‘These few particulars show the severity of the winter here. Of its accompanying delights I am afraid I can give your readers but a faint idea. Sleighing, which is very enjoyable, is in vogue for about six months in the year, but nothing short of an actual trial would enable anyone to realise the pleasure of gliding along rapidly in a sledge, under a brilliantly blue sunny sky, with the crisp white snow beneath.

‘Another favourite entertainment of the English,* as well as natives (and one also practised in Canada and Russia), is sliding down steep inclines on small sledges constructed for this purpose. The speed attainable is almost incredible. In this sport both old and young join.

‘The roads are quite good for walking on, since the snow is generally dry and well trodden. Anyone more ambitious can easily overrun the country on snow-shoes, a pair of which I have just received from Canada. The snow is rarely more than two feet deep, except where it has drifted.

‘There is usually very little wind, and the clear, frosty air is so invigorating, the sky so cloudless, and the sun’s rays so penetrating, that the cold is scarcely felt. The chilly feeling associated with the winter in England is, many say, unknown here, owing to the above causes and the dryness of the climate. Of

* This gentleman’s manner of writing is somewhat misleading. It would scarcely be thought that, ‘the English’ visitors here alluded to, consisted of *eight* persons, four of whom were the writer and his party! See the letter quoted on the opposite page.

course, there is exceptional weather, and this has been, to a certain extent, an exceptional winter here as everywhere. The rain which has fallen in such abundance in Italy and elsewhere has had its counterpart here in more frequent falls of snow and cloudier skies than usual. My description refers to what an English friend of mine, who has spent five winters here, calls the "normal" Engadine winter weather, such as I have experienced fully the whole of last and part of this winter.

'There is every inducement to tempt a lover of winter pastimes to spend the winter, or part of it, here.'

Not quite so enthusiastic, and therefore more trustworthy, is the following extract from a private letter written at Samaden on March 16, 1870 :—

'I have spent five months (from October 10th to February 26th) at St. Moritz, and liked the place on the whole, and the climate, I think, has done me good. During the winter we have had some splendid weather, little or no wind, very dry, and sometimes very cold. It is the *best* climate I have *ever* lived in, the air is so beautifully pure and dry. Of course we have had our share of unpleasant weather, especially at the beginning of the winter, when the snow was coming down; but snow every day is far preferable to rain, and it is rarely accompanied by much wind.

'Our party at the Kulm Hôtel has consisted of four English, three Germans, three Italians, and a French lady; in Mr. Strettell's house there have been four more English people besides himself. In this place (Samaden), which is only three and a half miles from St. Moritz, but at a slightly lower elevation, there has been an English family consisting of a lady and gentleman and five children. That, I think, is a complete list of the visitors who have passed this winter in the Upper Engadine.

'The great drawback in spending the winter at St. Moritz is the want of good food. The milk and bread and butter are good; but the meat is bad, and the soup invariably requires a certain amount of "Liebig's extract," to make it worth eating. For three months the only vegetables we had were potatoes. In fact, a person coming here for health gains greatly as regards climate, but loses greatly from want of good food and the ordinary home comforts. As for amusements, we have sleighing, a little skating, and also billiards. There are no level walks about St. Moritz, but the hotel has a terrace; here (at Samaden) there are three level walks, and no terrace. I

mention this because, when the country is covered all over to a depth of two or three feet with snow, it is of great importance to have some place to take a constitutional. In a place of this sort you are thrown very much on your own resources, and if you can sleep twelve hours out of the twenty-four, you can manage to get through the time.'

'It is a *great experiment* coming here, and I am not certain it is adapted for any but moderately strong persons who happen to have delicate lungs.'

Doubtless it is an 'experiment,' and if it be thought desirable to attempt to remove it from the stage of experiment to the stage of proof, there is an easy method of doing so; let the authorities of the Brompton Hospital select twenty well-marked cases of phthisis, some in its early and some in its chronic stage, let them send these cases to pass a winter, or two winters, at St. Moritz, and let these patients be under the constant care of a physician, who shall be required to make a regular report of their progress. Funds could not fail to be forthcoming to aid in effectually carrying out an inquiry so important as this one would prove to be.

In the mean time I think we should discountenance all attempts to *exploiter*—to borrow an expressive French word—this mountain air cure.

CHAPTER III

NOTES ON TARASP, IN THE LOWER ENGADINE.

'Monsieur! Monsieur! à six heures du matin vous prendrez à la Pauline trois verres! trois verres à la Pauline! A dix heures vous prendrez un bain; en sortant du bain vous prendrez . . . encore deux verres, et à cinq heures du soir, monsieur, vous prendrez . . . encore trois verres! Monsieur! ces eaux vous feront beaucoup de bien!!'—*Bubbles from the Brunnen of Nassau.*

ON September 2, one of the finest days of last season, I left St. Moritz in order to visit the mineral springs of Tarasp.

The English visitors had been departing rapidly during the previous week; rooms were becoming plentiful, and hotel-keepers civil.

I hired an einspanner to take me to Samaden, whence at 2 o'clock P.M. the diligence starts for the Lower Engadine. I was late in leaving St. Moritz, and for the first time during my stay in the Engadine, I saw one of those vehicles go at a brisk rate. The promise of a good *trinkgeld* accelerated the speed to something like ten miles an hour, and I reached Samaden, from St. Moritz, in twenty minutes!

A friend accompanied me as far as Samaden, and as we sped down the hill towards the pretty village of Celerina, we agreed that on a day like this, there were few more enjoyable places than the Upper Engadine. The fresh green meadows on each side of the road, made fresher by the heavy rains of the day before, were literally covered with the beautiful violet bloom of the meadow saffron (*colchicum autumnale*).

The least interesting part of the Engadine is certainly that which lies between Samaden and the commencement of the lower valley of the Inn. The road is almost a dead level, there are no lakes to add to its picturesqueness, as there are above St. Moritz, while the mountains which rise on each side have an arid, bare appearance, and present no very striking characters either of form or magnitude. On the whole, it must be admitted that this part of the journey is somewhat monotonous, although we are assured that those who have time to visit and explore the side valleys will find the region full of interest.

The Lower Engadine is very beautiful, more pastoral, more

picturesque, more varied, than the upper valley. After a five hours' drive through for the most part charming scenery, we reached the end of our day's journey, and the diligence deposited us in front of a large mass of buildings, almost buried in a narrow gorge between the bases of the mountains on each side of the valley. Some friends came out to greet us on our arrival, and a head-waiter took charge of us, whose manners and English would do credit to a butler in Grosvenor Square. In short, we were at the Tarasp Kurhaus. This is a most elaborate building, affording accommodation for 300 guests. It is under excellent management, and there are very few first-class hotels in Europe in which one is made more comfortable than here. The *salle à manger* is a really magnificent apartment; the *salons* are large and elegant, the bed-rooms scrupulously clean, lofty, well ventilated, and comfortably furnished. There are also in the hotel a post-office, telegraph bureau, baths, billiard-room, *salle de danse*, ladies' room, and many handsome sets of private apartments. There is a resident physician (Dr. Killias) and a resident English chaplain (the Rev. N. B. Whitby). The English visitors are much indebted to the latter gentleman for the energy he constantly displays in endeavouring to promote their comfort. It is, however, only due to the intelligent manager of the bath-house to state, that he has shown an entire willingness to adopt every suggestion made by Mr. Whitby for the advantage of English guests. I understood that this season (1870) there were to be added to the existing accommodation a gymnasium, a well-rolled and turfed croquet-ground, an orchestral band, a regular supply of all the leading English newspapers, periodicals, and reviews; boats also are to be provided on the lake, and the right of fishing is to be preserved to the guests of the Kurhaus; moreover, the proprietors have with great liberality offered the use of a convenient building adjacent to the Kurhaus for the English church service, and at the same time placed a sum of money at the disposal of the chaplain sufficient to fit it up appropriately for that purpose. It may also be interesting to many to know that Mr. Whitby is desirous of establishing a daily service, and an early celebration of the Holy Communion.

As my interest in Tarasp was primarily medical, I began the morning after my arrival to visit the several mineral springs, to the presence of which it owes its rapidly increasing celebrity. With the kind assistance of the chaplain and the

resident physician, I was enabled to make the best use of the limited amount of time I had at my disposal.

The information I have to give with respect to this health resort will naturally arrange itself under the three following heads:—1. The nature, composition, and therapeutic effects of its mineral springs. 2. The nature of its climate. 3. Some topographical and general details.

No fewer than twenty mineral springs rise very near each other in the neighbourhood of Tarasp—some alkaline and aperient, some chalybeate, and others, in the Val Plafna, behind Tarasp, sulphureous. The springs to which Tarasp chiefly owes its repute are the saline-alkaline sources which rise close to the banks of the Inn, and in the immediate vicinity of the Kurhans. Those that are used for drinking are situated on the right bank of the river; there are others on the left bank, which are used for bathing purposes.

The drinking springs are named the St. Lucius and the St. Emerita; they rise quite close together, and are almost identical in composition. The St. Lucius is somewhat richer in mineral constituents, and contains more carbonic acid. I give the composition of the St. Lucius source. In a pint (sixteen ounces) of the water there are 95·6225 grains of mineral substances, made up of

Carbonate of lime	.	.	.	12·4323 grains.
„ magnesias	.	.	.	5·0764 „
„ protoxide of iron	.	.	.	0·1520 „
„ sodium	.	.	.	27·2294 „
Chloride of sodium	.	.	.	29·4013 „
Iodide of sodium	.	.	.	1·5360 „
Sulphate of sodium	.	.	.	16·5473 „
„ potassium	.	.	.	2·9975 „
Silica, phosphoric acid, &c.	.	.	.	0·2503 „

The carbonates are here calculated as simple carbonates, but they are all contained in the water, combined with some carbonic acid in the form of bicarbonates. There are also 33·86 cubic inches of free carbonic acid contained in a pint of this water. It will be seen, then, that this spring contains a large proportion of chloride of sodium, very nearly an equal quantity of carbonate of sodium, a large amount of the aperient sulphate of sodium, the alkaline carbonates of lime and magnesia, and an appreciable quantity of iron.

As to the amount of iodide of sodium, which appears from the above table to be present in this spring, I must observe

that there is clearly a mistake here in the calculation. It would be a very important constituent indeed, did it exist in anything like the proportions herein stated, but by comparison of other percentage analyses, I find there is but a mere trace of this substance—viz. 0·0002 in a thousand parts, or rather less than $\frac{1}{5000}$ th of a grain in a pound! This very inaccurate statement has been carelessly copied into English works on the Swiss baths and watering-places. Compared with other European spas, the St. Lucius and St. Emmerita springs of Tarasp resemble most nearly the waters of Vichy and Carlsbad.

The differences are chiefly these—the Vichy water has much less carbonic acid, very much less chloride of sodium, scarcely any sulphate of sodium, less magnesium salts, and a mere trace of iron. The quantity of carbonate of soda is nearly the same in each. The relative quantities of their chief constituents are shown in the following table.

<i>In 10,000 parts.</i>			
		St. Lucius, Tarasp.	Grande Grille, Vichy.
Carbonate of sodium	. . .	35·455	36·54
Chloride „	. . .	38·283	5·43
Sulphate „	. . .	21·546	0·168
Sulphate of potassium	. . .	3·903	3·362
Salts of magnesium .	. . .	6·61	2·0
Carbonate of iron .	. . .	0·198	0·02
Carbonic acid . . .	. . .	45·426	26·65

It will be seen, then, that the Tarasp water is as alkaline as the Vichy water, but that it contains a much larger proportion of aperient salts, and that it is also mildly chalybeate.

The Carlsbad water has, again, much less carbonic acid, less chloride of sodium, less carbonate of sodium, less magnesium salts, nearly the same quantity of the aperient sulphate of sodium, a much larger quantity of the aperient sulphate of potassium, scarcely any iron, and it has a much higher temperature, probably a not unimportant difference. The springs of Carlsbad vary from 125° to 165° Fahr., those of Tarasp from 40° to 45° Fahr. The following table will show clearly the extent of these differences:—

<i>In 10,000 parts.</i>			
	St. Lucius, Tarasp.	The Sprudel, Carlsbad.	
Sulphate of sodium	21·546	19·48	
„ potassium	3·903	12·2	
Chloride of sodium	38·283	11·36	
Magnesium salts	6·61	0·52	
Carbonate of soda	35·455	11·8	
„ iron	0·198	0·04	
Carbonic acid	45·426	10·123	

It will be noticed that the Carlsbad water contains more of the aperient alkaline sulphates; the Tarasp spring, on the other hand, contains three times as much chloride of sodium, and nearly three times as much carbonate of soda. We find, therefore, that the Tarasp water combines the alkaline character of the Vichy and the aperient character of the Carlsbad springs, while the presence of so large an amount of carbonic acid renders it more agreeable as a beverage, and promotes the absorption of its constituent salts. The presence of an appreciable quantity of iron renders it also a blood restorative.

There is scarcely a spring in Europe that is known to possess so many important qualities.

But Tarasp has the additional advantage of possessing several very important acidulous chalybeate springs of a purely tonic character. The one most commonly drunk is the St. Bonifacius spring. It is situated on the right bank of the Inn, about a mile distant from the Kurhaus. It contains quite as much iron as the stronger spring at St. Moritz, but rather less carbonic acid. In the table which follows, the constituents of these two springs are contrasted:—

<i>In 1,000 grammes.</i>			
	St. Bonifacius Quelle. Tarasp.	Paracelsus Quelle. St. Moritz.	
Carbonate of lime	1·9023	0·8911	
„ magnesium	0·3366	0·1583	
„ protoxide of iron	0·0330	0·0329	
„ manganese	—	0·0043	
„ sodium	1·0325	0·2074	
Chloride of sodium	0·0570	0·0404	
Sulphate „	0·2147	0·3481	
„ potassium	0·0955	0·0205	
Silica	0·0185	0·0495	
Phosphoric acid	—	0·0006	
Alumina	—	0·0004	
	<hr/> 3·6901	<hr/> 1·7535	

Of free carbonic acid there are 37·91 cubic inches in 32 cubic inches of the St. Bonifacius well, and 51·20 cubic inches in the same volume of the Paracelsus well. This spring has a slightly chalybeate taste, which is not unpleasant, owing to the large amount of carbonic acid it contains.

A milder chalybeate spring rises close to the Kurhaus, the Carola spring; it contains only half as much iron as the Bonifacius, but it has, to my thinking, the great advantage of containing only one-fourth the quantity of carbonate of lime, a mischievous ingredient in many cases where iron waters might otherwise be useful.

There are several more iron springs in the district of Tarasp, but the only other to which I shall now call attention is the Wyh spring, which rises out of the ground, quite unprotected and unenclosed, in one of the meadows on the hillside above the village of Schuls, and about twenty minutes' walk from the Kurhaus. This spring contains a considerable quantity of iron, rather more than the Alte Quelle at St. Moritz, and its water, as it streams down the mountain-side, deposits an abundant red ferruginous covering on the soil it flows over. It rises in a most picturesque and somewhat out-of-the-way spot, and is one of the pleasantest mineral waters to drink I have ever tasted. It is not, however, much frequented. We found a tumbler hidden under an adjacent bush, which had been left there by a benevolent fellow-countryman for the use of those who might subsequently find their way to this delightful spring. We made use of it and returned it to its hiding-place.

Of the sulphur springs in this locality the one in Val Plafna and another in Val Dragun, on the way from the upper village of Schuls to the village of Fettan, are the most important. They are both impregnated with sulphuretted hydrogen. The Dragun spring appears to be an acidulous chalybeate spring saturated with sulphuretted hydrogen. These sources have not yet been enclosed or utilised.

I have now a few words to say as to the therapeutic action of these waters.

It will not be difficult, bearing in mind the composition of the mineral springs, to analyse briefly their action on the human economy.

The primary effect of these alkalo-saline springs must be an antacid action on the gastric mucous membrane. After absorption of the saline constituents, we naturally get increased

activity of the secreting organs, by which these salts are eliminated from the blood. If the waters be taken early in the morning, as is generally ordered, with gentle walking exercise, several fluid motions from the bowels are commonly obtained before breakfast or immediately afterwards. The diuretic action of the water is manifested later in the day. It is further reasonable to conclude that when a considerable quantity of a strongly alkaline and saline fluid is taken into an empty stomach, from which it must at once pass into the portal system of veins and thence through the secreting structure of the liver, that the condition of this organ and the character of its secretion may be greatly modified thereby. We know that sodium is the base with which the acids of the bile are found combined, and therefore, I think, be but little doubt that the internal administration of dilute solutions of the carbonate of sodium exert an important influence in modifying the character of this secretion.

One of the most useful remedies in cases of jaundice associated with congestion of the liver, as well as in cases of obstruction from biliary calculi, or from the presence of inspissated bile in the duct of the gall-bladder, is large draughts of warm water containing carbonate of sodium in solution. What is the Carlsbad water, which is found to be so efficacious in the relief of biliary concretions and in the reduction of fatty and congested livers, but a warm dilute solution of carbonate of sodium with some additional saline purgative constituents? Doubtless the warmth of the water, in this instance, favours its action. The Tarasp water is much richer in the alkaline carbonate of soda, and very nearly as rich in aperient salts. We are therefore quite prepared to hear that these waters are found especially useful in visceral congestions and obstructions, as, for example, chronic affections of the liver, hyperæmia of that organ and the fatty liver arising from errors in diet, certain cases of jaundice, and gall-stones; congestion of the spleen after intermittent fevers; dyspepsias, especially those associated with excessive formation of acid and with vomiting, and originating in want of exercise, improper or irregular feeding, or obstinate constipation; general corpulence; chronic gout and rheumatism—conditions especially associated with increased development of acid substances in the blood or with defective action of the eliminatory organs. Tapeworms are said to be occasionally expelled during the use of these springs. Some forms of

catarrhal affection of the kidneys and bladder, and disposition to the formation of renal calculi, are also relieved here, just as, indeed, they are by the use of the Vichy water. Disorders of menstruation, associated with a chronically congested state of the uterus and ovaries, are reputed to be relieved in a very remarkable manner by a course of the waters at Tarasp. Some cases of chronic eczema have also been greatly benefited here. It is further stated that persons suffering from chronic laryngeal or bronchial catarrh with hoarseness are relieved by drinking these waters, and some physicians believe them to be useful in the incipient stage of pulmonary tuberculosis. It is, however, very probable that the pure and invigorating mountain air has more influence in producing the improvement observed in cases of pulmonary disease than the use of the mineral springs.

As to the quantity of water that is usually taken, patients begin with two or three glasses (each holding six ounces), and increase gradually to six or eight. These are drunk in the morning before eating, at intervals of a quarter of an hour, gentle walking exercise being taken all the time. It not unfrequently happens that persons with weak digestions suffer considerable inconvenience from headache and flatulence if they drink any quantity of cold water before breakfast. When such is the case it is better to take an early light breakfast, and drink two or three glasses of the water two or three hours afterwards. If necessary, a glass or two more may be taken late in the evening. A common practice also is to warm the water before drinking.

The waters are not pumped up as at St. Moritz, but are ladled out by an attendant from the mouth of the source.

It is very obvious that a powerfully alterative aperient and alkaline water should not be taken continuously for a long time. There are very few cases in which its use should be prolonged without interruption for longer than a fortnight; and many cases would probably derive much greater benefit from a combination of the saline and the chalybeate treatment than from either singly—the saline water for three or four days, then the chalybeate for a similar period, and so on. I am thinking especially of those cases of anæmia in females, associated with obstinate constipation and disorder of the generative system, in which we know, as a matter of common observation, that preparations of iron are rarely useful unless combined with an aperient, and that frequent aperients are

injurious unless combined with some tonic remedies. Tarasp, with its saline aperient water on the one hand, and its braeing chalybeate spring on the other, seems to be exactly suited to such forms of disease.

In the next place I would desire to say a few words on the climate of Tarasp. This district, situated at an elevation of between 4,000 and 4,500 feet above the level of the sea, possesses all the invigorating characteristics of an Alpine climate, while it has the advantage of being much less severe and rigorous than that of the Upper Engadine. There are here fewer sudden changes of temperature, and an unexpected fall of snow in the summer months, by no means an uncommon occurrence at St. Moritz, is at Tarasp quite an exceptional event. The milder character of the climate is indicated by the much greater luxuriance of vegetation; rye and flax are extensively cultivated in this district, and fruit orchards flourish near Schuls, while the local Flora is exceedingly rich and diversified.

As well as being milder, the air is not so dry and rare as in the Upper Engadine—a condition which occasions frequently most uncomfortable excitement and irritation in many cases of functional nervous disorders which have been of late years sent in considerable numbers to these high Alpine stations. Unpleasant and troublesome herpetic eruptions about the face are very commonly produced in persons with delicate skins by the dry stimulating air of St. Moritz. These are not so frequently observed in the milder climate of the Lower Engadine. This part of the valley is almost entirely protected from the north and north-east winds, the prevailing winds being the south-east and north-west.

The snow begins to melt here in April. The spring is short, as in all mountain districts, and in June the summer is so far advanced that on the 15th the bath season commences. This continues to the end of September, a month generally remarkable for constantly fine genial weather, the only drawback being the shortness of the days. The mean atmospheric temperature in the months of July and August ranges from 56° F. to 60° F. The maximum and minimum temperatures noted in the same months were 82° F. and 37·5° F. It will thus be seen that the climate of Tarasp especially commends itself to those cases in which it is thought desirable to try the influence of mountain air without incurring the risk which certainly attaches itself to an exposure to the sudden changes

of temperature, the highly rarefied air, and often the continuous cold of the Upper Engadine.

Also, on leaving the Upper Engadine, Tarasp offers an admirable intermediate point where patients may break the suddenness of their descent into the plains of Italy or Switzerland, which to many persons proves very trying, and the presence of chalybeate springs of a precisely similar character to those of St. Moritz offers facilities for continuing or prolonging the course of steel waters if it be thought desirable to do so.

This account of Tarasp would be very incomplete if I were to omit to add to the preceding remarks on its climate and mineral springs a few topographical and general details.

The quickest way of getting to the Lower Engadine from England is through Paris and Bâle to the Landquart station on the railway between Zurich and Coire—it is the next station but one after Ragatz. A little distance from this place, the beautiful and picturesque valley of the Prattigau opens. The road ascends through this valley to Davos, in the Davos-Thal, which is reached in about six hours by diligence or by posting. From Davos a new carriage road crosses the Fluela pass to Sûs in the Lower Engadine, and by this route Tarasp may be reached in about seven hours from Davos, so that the whole journey between Landquart and Tarasp may be accomplished in one rather long day, and the entire distance between London and that place in three days, sleeping one night on the road at Ragatz or Landquart.

I have heard it remarked that ‘Tarasp is in a hole,’ and an impression of this kind is certainly produced upon one when, coming from the Upper Engadine, the diligence drives down to the left bank of the river and deposits one at the Kurhaus, which is built at the bottom of the somewhat narrow gorge through which the Inn here flows. But although it has pleased the proprietors to build the *Établissements des Bains* at the bottom of this gorge in order to be close to the principal mineral springs, it does not follow, nor is it true, that ‘Tarasp is in a hole.’ Tarasp is the name of the district, and a spot more beautifully situated or with greater natural advantages it would be difficult to find. It forms a small plateau, around which spreads a hilly country covered with meadows, corn-fields, and wooded slopes in charming variety, crowned on each side by mountain summits of singularly bold and striking out-

lines. Beautiful lateral valleys, the sides of which are covered with shady and fragrant pine woods, penetrate deeply into the recesses of the Alpine chain, and afford a great variety of singularly attractive walks. For mountain climbers there is every kind of work, from rugged hitherto unscaled peaks to those lower points of view which may be described, in guide-book phraseology, as 'easily accessible for ladies;' while the largest glacier fields in this part of the Alps—the *Vadret-Lischanna*—can be readily reached in a few hours. One of the great charms of the place is the number of pleasant shady walks over the wooded parklike hilly slopes in the immediate vicinity of the springs, which can easily be prolonged into more ambitious efforts as the strength of the invalid returns.

Those who object to the situation of the Kurhaus can obtain excellent accommodation at the Belvidere Hotel at Schuls, which is admirably placed, and distant about a mile from the springs, to which, however, residents at the hotel are conveyed in carriages daily free of charge. But commend me especially to the little hamlet of Vulpera, containing some homely, but good *pensions*, where most assuredly the Kurhaus ought to have been erected; it is placed in a sunny and pleasant open spot about 300 feet above the bath establishment on the opposite bank of the Inn, and from it a good zig-zagged path leads in about seven minutes to the mineral springs.

The village of Schuls, a most interesting spot, lies at the base of the slate mountains on the left side of the valley. It consists of two pretty little villages named Ober and Unter Schuls. They are surrounded by well cultivated orchards, for in this comparatively mild climate fruit trees flourish greatly. High above on the mountain side are green Alps, broken by stretches of pine-woods, while down by the banks of the Inn lie fresh meadows. Schuls is protected by its position from cold winds, and the snow soon melts on its sunny heaths. The houses and buildings in the village are good, the old church stands, most picturesquely, on a high rock, and in olden times it offered a place of refuge and was often bravely defended. A fierce encounter took place on this spot in 1621 between the inhabitants and the invading Austrians. Men and women equally fought with the energy of despair; their courage however was unavailing against the overwhelming numbers of their assailants, although they repeatedly drove back the besiegers. At length the brave little band gave way, but not until the ground was covered with their own bodies and those

of their enemies. Close below the ehureh a bridge leads over the Inn to Vulpera and Tarasp, and then there is a second one over the Searlbach, which here rushes forth out of a deep ravine.

The mountains on the right bank of the river present a very different formation from those on the left. Those above Tarasp are joined together by high *grats*, and from them short yet high ridges stretch towards the Inn. Nearly every one of these is surmounted by two massive pinnacles terminated by steep jagged points, presenting altogether a great variety of graceful and striking forms.

In front of this principle chain, a second runs from Tarasp towards Finstermunz, not inferior to the first in height. It begins with the Piz Pisog (10,427 ft.) and ends near Martinsbrück in the Piz Lat. The two principal points of this chain projecting towards the Inn, are the Piz St. Jean and the Piz Lisehanna. Behind the latter, and enclosed by fearfully wild rocky precipices, lies the Vadret-Lisehanna, the single great glacier of this side of the valley, being nearly six miles long and more than a mile and a half wide. There are many other small glaciers amongst these mountains, but no great ones, on account of the steepness of the mountains' sides and the narrowness of their ridges. From their summits deep ravine-like valleys stretch downwards towards the Inn. The principal of these are the Val Lisehanna, Val Triazza, Val Uina, and Val Assa. The Searl valley, with its lateral branches, insinuates itself deeply between the two adjacent ranges of chalk mountains.

There is scarcely any portion of the whole Alpine chain which presents a wilder or more broken outline than the mountains on the southern side of this valley; while it is rare to see such gigantic mountain forms so close to one another, and at the same time separated by such deep valleys. On this account it is that their outlines appear so sharply cut. The Piz Pisog rises directly to the south of Tarasp, in bare grey dolomite walls, whose perpendicular and inaccessible sides lead to a slender-pointed, snow-covered summit. This mountain is one of the most imposing of Alpine forms; seen from Tarasp it appears as a pyramid, while behind it lengthens out into a long ridge studded over with many small low points, till it reaches the upper part of the rocky valley, Zuort, which is almost entirely occupied by glacier. The district of Tarasp spreads out at the foot of this grand mountain, and is surrounded on all

sides by a hilly country covered with green meadows and patches of woodland in charming variety. Scattered here and there are hamlets and single houses, which constitute the parish of Tarasp; westward lies the hamlet of Fontana, commonly described as the *village* of Tarasp, and above this, on a high rock, the old Castle of Tarasp. The white walls of this fine old ruin are seen from far and wide, and form an ornament to the whole valley. It is a conspicuous object even from the height of the Fluela Pass. The building is still in good condition, and is being restored with the view of converting it into a *pension* for English families. The view from it is one of the most gorgeous it is possible to conceive, extending over the whole of the Unter Engadine valley. It once served as the seat of the Austrian governor of this district, and the Austrian eagle may still be seen on its outer walls. The principal church of the valley, in connection with a Capuchin convent, is situated at Fontana on the bank of a beautiful clear lake of some extent, which affords good fishing. The whole of this region is remarkably beautiful.

Tarasp was until 1815 an Austrian possession, and with its rocky fortress, proved very troublesome to the rest of the Canton, particularly in time of war. The inhabitants, about 300 souls, are Roman Catholics, and speak, for the most part, German. Above the lake there is a second plateau, separated from the lower one by a steep terrace, and on this plateau there is a second small lake, the *Schwarze See*. On the other side a stream called the Chlemgia flows through a fearfully deep gorge, its white foaming water eddying swiftly over black serpentine rocks.

The hamlet of Vulpera, which I have already alluded to as a charming spot for the residence of the visitors to the baths, is about half-an-hour's walk from the castle. It is about midway between the Chateau of Tarasp and the village of Sehuls. It is built on a little plain above the Inn on its right bank. The river here flows over a deep rocky bed, close by the side of which the Kurhaus has been erected.

One of the most remarkable natural phenomena in the neighbourhood of Tarasp are the so-called *Moffete*. These are orifices in the ground, in the meadows on the way between Sehuls and Fettau. Carbonic acid gas streams out of these holes in sufficient abundance to suffocate any small animals that come near them. All vegetation is also destroyed for some distance round. We observed numerous dead insects,

small birds, mice, and even a snake, scattered around these curious apertures in the soil.

Tarasp is a most convenient centre for interesting excursions; situated as it is within a few hours of the grand defile of the Finstermunz and the Austrian frontier, within a day's walk of the finest pass in the Alps—the Stelvio, and bounded directly to the north by the peaks and glaciers of the Silvretta group.

CHAPTER IV.

NOTES ON THE FLORA OF ST. MORITZ AND TARASP.

Cette brillante flore des Alpes m'a poursuivi de son image : c'était comme une idée fixe, comme un de ces refrains qui durant des jours et des semaines se chantent d'eux-mêmes dans la mémoire et qu'on fredonne sans y songer.—E. RAMBERT.

It is scarcely possible to pass a season at St. Moritz without taking some interest in those beautiful Alpine flowers which grow in such varied profusion on the surrounding mountain sides and in the neighbouring valleys. There is no district in the whole of Switzerland where one can study with so much ease the special characteristics of the vegetation of the Alps as in the villages of the Upper Engadine. Owing to the great elevation of this part of the valley of the Inn, numerous species of Alpine plants are to be gathered within a few feet of the door of one's hotel, which can only be obtained in other parts of Switzerland after a long and arduous climb ; so that without any laborious or dangerous ascents some of the rarest and most delicate of Alpine flowers may be collected even by children. Two localities in the Upper Engadine are especially rich in different species of wild-flowers : one is the Fex Valley, the entrance to which is placed close to the pretty village of Maria, just beyond Sils, and about an hour's drive from St. Moritz, in the direction of the Maloya ; the other is the Val Bevers, about the same distance from St. Moritz in the opposite direction, beyond Samaden. Another valley more distant, but celebrated also for the number and variety of Alpine species which can be obtained there, is the Val del Fain, which opens to the south-east of the Bernina road, a short distance before one reaches the summit of this pass. But even in the woods and meadows immediately surrounding St. Moritz numbers of beautiful wild-flowers may be gathered, and an hour's ramble along the hill sides in any

direction, will be rewarded with an abundant harvest of interesting species.

What strikes one most forcibly as a characteristic of these Alpine flowers is the richness and intensity of their colours, and their very large size compared with the scanty foliage and dwarf-like aspect of the plants which produce them. The purpose of this great development of the flowers seems to be to gain the full advantage of the brief but powerful sunshine, in order that they may ripen their seed as rapidly as possible.

Common British species, many of which may be found growing in these regions, appear, by the great size and intense richness of colour of their blossoms, to present quite different appearances from those with which we are familiar. This is especially noticeable with regard to the species of House-leek (*Sempervivum*), and Stone-crop (*Sedum*), which are very abundant on some of the hills in this neighbourhood, and present a perfectly dazzling variety and brilliancy of hues. The common Monkshood (*Aconitum Napellus*) grows here in some of the meadows in great luxuriance, and its large and stately racemes of blue helmet-shaped flowers look very effective.

One of the commonest of plants around St. Moritz is the mountain Arnica (*Arnica montana*), a composite plant, whose large, deep orange-yellow flower-heads are met with in all directions. It is thought to possess virtues of a healing nature, and the tincture of arnica is a common application to wounds and bruises in our own country, but whereas we make a spirituous extract of the root, the natives use an infusion of the flowers. The forests in the Engadine reach a greater height than in any other part of Switzerland, often extending to 6,600 feet and upwards. They are composed almost exclusively of three species of coniferous trees—the larch, the pine, and the arolla or pinus cembra. The latter is the characteristic tree of the forests of the Engadine, and grows highest on the mountain sides. Its wood is remarkable for its durability, its agreeable perfume, the fineness of its grain, and the ease with which it is worked. Its cones are about three inches long and two inches broad; the seeds are large and contain a sweet oily kernel of a pleasant taste, which in some parts is used as food.

The arolla is very rare in the other cantons of Switzerland. The deep sombre hue of its foliage and its stern majestic aspect contrast strongly with the elegant outline and delicate green

of the larch. It is curious to notice the length of time it takes one of these trees in this elevated region to reach a certain development. As many as 250 consecutive woody layers, indicating as many years of growth, so close together as to be distinguished with difficulty, have been counted on the trunk of an arolla only two feet in diameter. This slowness of growth is explained by the short duration of the summer, and hence the renewal of these forest trees when once they are destroyed is very difficult. The Bergamesque shepherds, though they doubtless add somewhat to the picturesqueness of the landscape, and pay also a considerable sum to the commune, yet do great and irreparable damage to the young forest trees through the injuries inflicted on them by their flocks.

The following list of species of plants found in the neighbourhood of St. Moritz and Tarasp, does not pretend to be an exhaustive one. I believe, however, it will be found to contain nearly all the most interesting and rare flowering plants. I am indebted to Dr. Killias for the names of the species that have been found in the valleys and on the mountains around Tarasp. The method I have adopted of arranging them under their natural orders seems to me to be the most convenient, while it is certainly the most scientific. I have also added an *alphabetical* index. In nearly every instance the familiar English name of the plant is given, and in many cases the German name also. Wherever it has been convenient to do so, I have briefly mentioned one or two of the more striking characters of the plants in order to facilitate their recognition by beginners.

The letters S.M. refer to the neighbourhood of St. Moritz, the letter T. to that of Tarasp.

I. NATURAL ORDER: RANUNCULACEÆ.

Stamens, indefinite, hypogynous; ovary, apocarpous.

RANUNCULUS MONTANUS (Mountain Buttercup). Germ. *Berg Hasenfusz*.

A small plant, often flowering when not more than three inches high; its leaves are in compact tufts, of a dark shining green colour, and deeply cut, the lobes rounded; the flowers are of a brilliant yellow, a little larger than those of the common buttercup, and covering the plant in a dense mass. S.M. Brail. (Spring.)

R. GLACIALIS (Glacier Buttercup). Germ. *Gletscher Hasenfusz*.

One of the highest of mountain plants, growing on the margins of glaciers and eternal snows. The dark, brownish-green leaves are smooth and deeply cut; the calyx is covered with soft, shaggy, brown

hairs; the flowers are rather large, and the petals white, tinted with a dull purplish rose on the outside. S.M. Val Bevers, Alp Err, Piz Languard, Piz Corvatsch, Cima di Margna, and in many other localities. (June.)

R. ALPESTRIS (Alpine Crowfoot). Germ. *Alpen Hasenfusz*.

A very small and pretty species, three to four inches high. leaves roundish in outline, deeply cut, dark green and shining, flowers *pure white*, one to three on each stem. Grows generally in moist rocky places, as the higher mountain pastures. S.M. Albula Pass. (August.)

R. ACONITIFOLIUS (Fair Maids of France).

A large variety, often growing to two or three feet in height, and having rather small white flowers; leaves deeply divided, nearly down to the base. Grows in moist places in Alpine woods and valleys. T. on the Alps by Fettau.

R. PARNASSIFOLIUS (Parnassia-like Buttercup).

A beautiful species, with stems from two to eight inches high; leaves entire, cordate or reniform, dark brownish green; flowers one to twelve on each stem, beautiful pure white, with yellow centres. S.M. Val Bevers, Piz Err, Piz Padella.

R. RUTEFOLIUS (Rue-leaved Buttercup). Germ. *Scheuchblume*.

Leaves deeply cut, the radical leaves twice cut; stem three to six inches high, bearing usually but one handsome flower, which is about an inch across, white, with an orange centre, and occasionally rose-tinted at the margin. S.M. Val Lavirum. (July.)

R. PYRENÆUS.

A very elegant species of buttercup; the flower is composed of beautifully delicate white petals, and measures about an inch across. The leaves are nearly linear and undivided. The whole plant is from three to four inches high. S.M. Alp-Otta, near Samaden, Piz Languard.—Agagliog's Rocks, Roseg Glacier.—T. Piz Arina, Piz Campatsch.

R. LAMIGINOSUS.

T. Adjacent valleys.

THALICTRUM ALPINUM (Alpine Meadow-rue).

A plant generally found at considerable elevations in mountain regions, it is common in the Highlands of Scotland. This is a dwarf species, stem from four to six inches high; leaves compound; the leaf-stalk twice divided into three or five branches; the leaflets small and rounded with indented or lobed margins. The few drooping clustered flowers have no petals, and their four small petal-like sepals are almost concealed by the prominent stamens, ten to twenty, whose long anthers project beyond the calyx. T. Scarl Valley.—S.M. Val Lavirum. (Summer.)

T. AQUILEGIFOLIUM.

A tall, handsome lilac variety, found near the path leading to the Morteratsch Glacier. S.M.

T. MINUS (Maidenhair Meadow-rue).

A species greatly admired on account of the resemblance of its foliage to that of the Maidenhair fern. It is a native of Britain, but by no means common, being found occasionally in Scotland and

North-Western England. Its flowers are inconspicuous, the sepals of a pale greenish-yellow, with a pink tinge. Stamens numerous, with long narrow anthers. T. Adjacent valleys.

T. FÆTIDUM.

T. Adjacent valleys.

ANEMONE SULPHUREA (Yellow Wind-flower). Germ. *Schwefelgelbis Windröschen*.

Differing from the Alpine anemone only in the yellow colour of its flowers. It varies in size according to the altitude at which it grows, from four inches in height near the mountain summit, to two feet in the valleys. The plants of this genus have no petals, but their sepals are coloured and petal-like, and usually six in number. Their leaves are radical, and the flower-stalk is naked, excepting three leaves which form an involucre usually at some distance from the flower. In this species the leaves are large and much divided, and the sepals are covered externally with a soft down. S.M. Val Bevers. (June.) Val del Fain.

A. VERNALIS (Shaggy Pasque-flower). Germ. *Frühlings Windröschen*.

A very dwarfed species; flowers large and shaggy; the sepals covered with brownish silky hairs. It flowers early in spring, and is usually confined to very elevated positions. S.M. Val Bevers. (May.)

ACONITUM NAPELLUS (Monkshood).

A fine stately plant, found growing wild in great abundance in shady places in the meadows around St. Moritz. Its stem grows erect to three or four feet in height, and ends in a handsome dense raceme of dark blue helmet-shaped flowers. The leaves are dark green, and divided to the base into five or seven deeply cut linear-pointed segments. It is a medicinal plant of great activity; all parts of it are poisonous. On more than one occasion the root has been eaten for horse-radish with fatal consequences, although the two roots do not the least resemble one another.

A. PANICULATUM.

T. Adjacent valleys.

AQUILEGIA ALPINA (Alpine Columbine).

This is one of the grandest of Alpine flowers, measuring nearly three inches across. The flowers are much finer than those of our common garden columbines, of a showy blue colour, and having stamens which project beyond the petals. The stem varies from one to two feet in height; the leaves are compound, each leaf being composed of three primary divisions; each of these divisions being again divided into three lobes, and each lobe being deeply cut. The leaves are almost as elegant as the flowers. There is an exquisite *variety* which has the centre of the flower white. S.M. The cliffs of Piz Err.

A. ATRATA.

Another species, found in the neighbourhood of San Moritz, with smaller flowers of a very much darker colour, brownish purple, and leaves much less divided.

II. PAPAVERACEÆ.

Flowers regular. Sepals two, caducous; Petals, four; Stamens, numerous.
Ovary, syncarpous.

PAPAVER PYRENAICUM (Alpine Poppy). Germ. *Mohn*.

A dwarf poppy about three or four inches high, with flowers of a beautiful orange colour; dissected leaves, with small pointed lobes, slightly hairy. A native of the higher Alps. S. M. Val del Fain. Cambrena Glacier; near summit of Canciano Pass. T. Val Plafna. (July.)

III. CRUCIFERÆ.

Sepals, 4. Petals, 4. Stamens, 6, tetradynamous (four long, two short.)

ARABIS ALPINA (Alpine Rock-cress). Germ. *Gänsekraut*.

This simple little plant is commonly cultivated in our gardens at home. It is very widely diffused over the Alps. The stem is erect, with a few scattered sessile lanceolate toothed leaves, which are rather fleshy. Flowers in clusters, small; petals spreading; white or purplish. S.M. Common.

A. CILIATA.

Smaller than the preceding; stem not so erect; leaves oblong; margins not toothed, but fringed with delicate hairs. S.M. Abundant.

A. HALLERI.

S.M. Saluver near Celerina, also Lake of Poschiavo. (Junc.)

A. CÆRULEA.

A variety with purple flowers. T. Piz Minschun. S.M. Val del Fain.

A. PUMILA.

T. Piz Lat.

CARDAMINE PRATENSIS (Bittercress, Ladies' Smock). Germ. *Schaumkraut*.

A common British plant. Stem erect, about a foot high, pinnate leaves. Flowers pinkish purple, petals obovate and spreading. S.M. Common.

C. RESEDIFOLIA.

A dwarf species with white flowers. S.M. Val Bovers. (June.)

C. IMPATIENS.

A larger species; stem a foot high or more; on each side of the base of each leaf-stalk there is a curved appendage, embracing the stem, like a stipule. Petals very small and sometimes absent. T. Valleys adjacent.

C. ALPINA.

T. Piz Minschun.

CAPSELLA PAUCIFLORA (Shepherd's purse).

A small mean-looking plant, with few inconspicuous flowers. T. Near the village.

DRABA AIZOIDES (Sea-green Whitlow-grass).

Found indigenous in Britain, near Pennard Castle, Swansea. It is a dwarf plant, not exceeding three or four inches in height. The leaves are three or four lines long, sessile, linear, of a bright green colour edged with stiff white hairs, and forming dense tufts at the base of the leafless flower stem, which bears about a dozen or more bright golden yellow flowers in an erect raceme. S.M. Piz Languard.

D. FRIGIDA. Germ. (*Kaltes Hüngeblümchen*).

A very dwarf species, with a few *white* flowers. S.M. Piz Languard.—T. Val Muschens, near Scans.

D. NIVALIS.

The most diminutive of the genus. The leaves are covered with minute stellate hairs, which give them a whitish-green appearance. The whole plant when in flower is not more than two inches high. T. Piz. Lat. (Very rare.)

D. WAHLENBERGII.

T. Piz Minschun.

BISCUTELLA ALPESTRIS (Buckler Mustard).

S.M. Val Bevers.

ERYSIMUM LANCEOLATUM.

Common in Britain, related to the mustard; conspicuous yellow flowers, not unlike those of the wall-flower. S.M. Abundant.

E. STRICTUM.

T. Valleys adjacent.

HUTCHINSIA ALPINA.

A neat little plant with shining leaves, deeply cut into narrow lobes, and pure white flowers in clusters on stems about an inch high. S.M. Bevers. (June.)

H. BREVICAULIS.

S.M. Piz Padella. (August.)

IV. CISTACEÆ.

Wiry stems; opposite leaves; regular, showy rose-like flowers. Sepals, three; stamens indefinite; hypogynous.

HELIANTHEMUM GRANDIFLORUM (Large-flowered Rock-rose).

Leaves and shoots downy and hairy; large handsome yellow flowers. S.M. Adjacent hills.

V. VIOLACEÆ.

The very characteristic Violet Family.

VIOLA ALPESTRIS.

A beautiful yellow violet, growing abundantly in the meadows round St. Moritz. The plant grows to six inches or more in height; its flowers are of a rich handsome yellow, and the three lower petals are striped with thin black lines.

V. CALCARATA (Spurred Violet). Germ. *Gesporntes Veilchen*.

An Alpine species, often found growing very abundantly at great altitudes. Its large purple flowers contrast remarkably with the dwarf character of the plant, its leaves being scarcely visible in the turf. It is distinguished by having stipules deeply divided into three lobes at the top, and by its habit of increasing by runners under the soil. S.M. Val Bevers. (July.)

V. TRICOLOR (Heartsease).

Our common field pansy, but in this Alpine region with larger flowers and richer colouring of purple, white, and yellow. S.M. Val Bevers.

V. CANINA (Day Violet).

The common purple day violet. S.M. Val Bevers.

V. PENNATA.

T. Val Uina.

VI. CARYOPHYLLACEÆ.

Opposite entire leaves; regular flowers; definite hypogynous stamens; free central placenta.

DIANTHUS GLACIALIS (Glacier Pink).

A most lovely little plant, growing on the highest Alpine summits. Its tufts, just like short wiry grass, grow close to the ground, with leaves not more than half an inch to an inch long, and flowering stems from one to three inches high. This dwarf stem bears a large brilliant flower of the deepest and purest rose-colour, about an inch across or even more. The outer margins of the petals are slightly notched. S.M. Val Bevers, Piz Err, on the road from Mühlen to the lakes of Scalotta; Piz Padella.

D. SUPERBUS (Fringed Pink). Germ. *Stolze nelke*.

A large and handsome species, very abundant in the meadows around the lake of St. Moritz, easily known by its sweet fragrance, and by its petals being cut into strips or fringes for more than half their length. The flowers are of a lilac colour, and often present a dark spot or eye in the centre.

D. SYLVESTRIS (Wood Pink).

S.M. Common.

D. DELTOIDES (Maiden Pink).

Found in many parts of Britain. Flowers small, little more than half an inch across, but bright and pink-spotted or white. T. Valleys adjacent.

ALSINE RECURVA.

S.M. Bernina Pass, on banks of Lago Bianco; Val Bevers; near summit of Canciano Pass.

A. SUBNIVALIS.

S.M. Val Bevers.

A. ROSTRATA.

T. On rocks of Tarasp and Ardetz.

CERASTIUM LATIFOLIUM (Broad-leafed Cerast). Germ. *Breit-blätterisches Hornkraut*.

A shaggy, dwarf, tufted plant spreading freely, but not more than two inches high, covered with a silky down; large white flowers.

S.M. Piz Padella, near Samaden. (August.)

C. GLACIALIS (Glacier Cerast).

Not so shaggy as the preceding species; leaves narrower; flowers large and white. S.M. Val del Fain.—T. Piz Minschun.

GYPSOPHILA REPENS. Germ. *Gypskraut*.

Not a showy plant, growing to six or eight inches high; glaucous leaves spreading in dwarf tufts. Flowers in cymose clusters, white, veined with rose, on thread-like stems. S.M. Albula. (August.)

ARENARIA BIFLORA (Two-flowered Sandwort).

S.M. Cambrena Glacier and Val del Fain.—T. Val Floss.

LYCHNIS ALPINA. Germ. *Alpen Lichtnelke*.

This pretty dwarf lychnis is rare in Britain; it has been found on the summit of Little Kilrannock, a mountain in Forfarshire, and also in lonely and high mountain gorges in Cumberland. It rarely reaches six inches in height; leaves long and narrow, flowers pink in compact heads, petals narrow and deeply bifid. S.M. Piz Err, Val Lavirum, and Lago della Crocetta, on Bernina Pass. (July.)

L. FLOS-JOVIS.

A showy plant, with showy purplish flowers. T. Near Guarda.

SILENE QUADRIFIDA.

T. Scarl valley.

CHERLERIA SEDOIDES (Cyphel).

S.M. The grat between Mont Pers and Piz Cambrena.

VII. GERANIACEÆ.

GERANIUM SYLVATICUM.

The common wood geranium. S.M. Abundant.

G. DIVARICATUM.

T. Valleys adjacent.

VIII. POLYGALACEÆ.

POLYGALA ALPESTRIS (Alpine Milkwort). Germ. *Alpenkreuz Blume*.

S.M. Alpotta, near Samaden. (June.)

P. VULGARIS.

S.M. Val Bevers.

P. AMARA.

S.M. Val Bevers.

IX. RHAMNACEÆ.

RHAMNUS PUMILA.

T. Valleys adjacent.

X. LEGUMINOSÆ.

Flowers papilionaceous (resembling the flower of the pea). Stamens ten in one or two bundles.

HEDISARUM OBSCURUM.

A vetch-like creeping plant, with long handsome spikes of purplish-violet flowers; leaves pinnate with seven to nine pairs of leaflets, the stipules united opposite the leaves. S.M. By Stätzer See.

ASTRAGALUS ALPINUS (Alpine Milk-vetch). Germ. *Alpen Tragant*.

Found native on a few of the Scotch mountains. An attractive plant with short close racemes of drooping flowers, bluish purple, or white tipped with purple, on rather long peduncles. Flowers rather more than half an inch long; leaves pinnate with eight to twelve pairs of leaflets and an odd one. S.M. Alp Spignas.

A. ONOBRYCHIS.

Flowers purplish crimson, supported on peduncles an inch or more longer than the leaves, which are pinnate and about four inches long. A very handsome species. T. Adjacent valleys.

A. DEPRESSUS.

T. Near ruins of Steinsberg.

A. CICER.

T. Valleys adjacent.

PHACA ASTRAGALINA.

S.M. Val del Fain.

OXYTROPIS URALENSIS.

Not uncommon in Scotland. Leaves and peduncles springing from root-stock; pinnate leaves, each with from ten to fifteen pairs of leaflets and an odd one; leaflets oblong or lanceolate and hairy; peduncle about four inches long with a short dense spike of bright purple flowers. The whole plant is densely covered with short silky hairs. S.M. Piz Languard.—T. Piz Minschun.

O. LAPPONICA. Germ. *Lappländischer Spizkiel*.

Plant more glabrous than preceding; leaves, springing from stem as well as stock, longer, and leaflets more numerous; flowers smaller and fewer; petals blue, marked with white. S.M. Val Bevers; Albula. (June.)

O. CAMPESTRIS.

Found in one locality in Scotland, the Clova mountains. Flowers pale yellow tinged with purple; not so hairy as *O. uralensis*. T. Adjoining meadows.

LOTUS CORNICULATUS (Bird's Foot Trefoil).

A common British plant, with tufts of bright yellow flowers, often red at the upper part. S.M. Common.

HIPPOCREPIS COMOSA (Horseshoe Vetch).

Common also in the south of England. A small plant with deep-yellow flowers in an umbel, like *Coronilla*; small pinnate leaves, smooth leaflets. S.M. Abundant in meadows.

CORONILLA VAGINALIS.

T. Searl valley and ruins of Steinsberg.

VICIA CRACCA (Tufted Vetch).

Common in Britain. Flowers in one-sided many-flowered racemes, on peduncles rather longer than the leaves, of a fine bluish purple, and about five lines long. Leaves pinnate, ending in tendrils; leaflets nearly linear. The plant climbs by means of tendrils to a height of two feet or more. S.M. Common. (July and August.)

V. GERARDI.

T. Meadows adjacent.

TRIFOLIUM ALPINUM (Alpine Clover). Germ. *Alpen Klu*.

S.M. Piz Munteratsch. (June.)

T. BADIUM.

S.M. Val Bevers.

XI. ROSACEÆ.

Regular flowers, usually with indefinite stamens inserted on the calyx. In some apetalous genera (*Alchemilla*, &c.) the stamens are definite, but they are then distinguishable by their divided leaves and conspicuous stipules; ovary apocarpous or spuriously syncarpous from adhesion of the tube of the calyx.

ROSA ALPINA.

This beautiful shrub is a true member of the Rose family, and has no relation with the *Rhododendron* or 'Alpenrose' of the Germans. It is celebrated for having no thorns, but it is said to produce them when it descends into the plains! Its flowers are of moderate size and of the purest carmine; they are brilliant but fleeting, and the corolla often fades and perishes on the same day that it expands. S.M. Rocks in the neighbourhood.

R. RUBRIFOLIA.

T.

R. POMIFERA.

T.

POTENTILLA ALPESTRIS (Alpine Cinquefoil). Germ. *Goldfarbiger Fingerkraut*.

Closely related to the *P. verna*, found thinly scattered over hilly districts in England and Scotland. This plant, however, is larger, sometimes nearly a foot high. The radical leaves are composed of five wedge-shaped divisions notched at the top, and of a bright shining green colour. The flowers are about an inch across, and of a bright yellow. S.M. Piz Surlei.

P. FRIGIDA.

S.M. Piz Languard, Lago della Crocetta, near summit of Bernina Pass. T. Piz Cotschen.

P. ANSERINA.

The common silver weed. The flowers in this region are unusually large, and of a very brilliant yellow.

P. TORMENTILLA.

Another very common British plant, having small yellow flowers with four petals. S.M. Woods around.

P. GRANDIFLORA.

A large species with fine yellow flowers, and leaves composed of three sessile leaflets. S.M. Val Bevers.

P. CAULESCENS.

T. Ardetz, Scarl valley, &c.

DRYAS OCTOPETALA (Mountain Avens). Germ. *Dryade*.

A creeping plant, with crowded leaves in dense spreading tufts and large cream-white flowers; common in most Alpine districts, and found abundantly in the north of Scotland. It is an evergreen, its leaves are little more than half an inch long, deeply and regularly crenate, shining above, and white and downy beneath. The flower-stalks are erect, two or three inches long; calyx of eight segments, rather shorter than the petals, which are also eight in number. Numerous yellow stamens and numerous carpels, which when they have ripened into fruit have feathery appendages an inch long. S.M. Val Chamucra.—T. Its environs.

GEUM MONTANUM.

A dwarf genus, with large handsome yellow flowers. S.M. Val Bevers.

G. REPTENS. Germ. *Raukendes Sagenskraut*.

S.M. near Piz Ot, Piz Languard, borders of the Lago Bianco, Bernina Pass.—T. Piz Minsehun, Piz Arina, &c. (June.)

ALCHEMILLA PENTAPHYLLEA.

S.M. Surlei Pass.—T. Piz Grian.

COMARUM PALUSTRE or **POTENTILLA COMARUM.**

S.M. Near Stätzer See.

XII. ONAGRACEÆ.

Herbs with two, four, or eight stamens; ovary inferior.

EPILOBIUM ALPINUM (Alpine Willow-herb). Germ. *Weidenröschen*.

A dwarf species, seldom more than four or five inches high, with stems decumbent, and much branched at the base; leaves ovate, the upper ones nearly lanceolate and slightly toothed. The flowers are large in proportion to the size of the plant, they spring from the axils of the upper leaves, and form short leafy racemes. The petals are notched. The style ends in a club-shaped stigma. S.M. Val Bevers. It abounds in the Scotch Highlands.

E. FLEISCHERI.

S.M. Val Bevers.—T. Adjacent meadows.

E. ROSMARINI FOLIUM.

S.M. Near Morteratsch glacier, on left bank of stream.

XIII. CRASSULACEÆ.

Herbs with fleshy leaves, very regular flowers, and apocarpous or nearly apocarpous pistils. Carpels three or more.

There are several species of *Sedum* (Stone-crop) and *Sempervivum* (House-leek) in the neighbourhood of St. Moritz; but they are chiefly those which are common in other localities.

SEMPERVIVUM WULFENII (Yellow Flowers).

S.M. Val Roseg, near entrance.

XIV. RIBESIACEÆ.

RIBES ALPINUM

T. Adjacent valleys.

XV. SAXIFRAGACEÆ.

Herbs with regular flowers, definite stamens (as many or twice as many as the petals), syncarpous pistils, and two or more styles.

SAXIFRAGA CÆSIA (Silver Moss). Germ. *Murgrüner Steinbrech*.

A very dwarf saxifrage, found in small tufts, covering rocks and stones like a silvery moss. It is known readily by its extreme dwarfishness, and its three-sided keeled leaves, with white crustaceous dots on their margins. The flowers are white, about a third of an inch across, on smooth thread-like stems, from one to three inches high. S.M. Albula Pass, Val del Fain. (August.)—T. Scarl valley.

S. OPPOSITIFOLIA (Purple Saxifrage).

Low straggling tufts, seldom more than an inch high; leaves small, crowded, obovate, opposite, and ciliate. Handsome, rather large, purple flowers, growing singly on very short stout branches, but often so crowded as almost to conceal the foliage. S.M. Val Bevers. (June.)

S. STELLARIS (Star Saxifrage). Germ. *Steinbrech*.

Leaves spreading, in tufts, rather thin, obovate or oblong, tapering at the base. Stems erect, three to six inches high, leafless, but a small leafy bract under each pedicel. White starlike flowers, rather small, on slender spreading pedicels, forming a loose terminal panicle. Petals narrow and spreading. Capsule with two diverging beaks. S.M. Piz Gravatscha, near Bevers.

S. AIZOON.

Flowers greenish-white, not showy. The leaves, in silvery rosettes, are small, oblong, and obtuse, rather stiff and leathery, and bordered with fine teeth. The flower stems, six to twelve inches high, are smooth below, but covered with glandular hairs on the upper part. S.M. Val Bevers.

S. BRYOIDES.

A small tufted plant, with pale yellow star-shaped flowers. The foliage is almost moss-like in character; the leaves very small and lanceolate, in dense nearly globular tufts. S.M. Val Bevers.—T. Val Floss.

S. ANDROSACEA.

S.M. Val del Fain.

S. EXARATA.

S.M. Val Bevers.

S. PLANIFOLIA.

S.M. Albula Pass; Alp Falotta, near Mühlen; Cima di Margna.

S. CONTROVERSA.

S.M. Val Bevers, Val d'Agnelli, Julier Pass, Val del Fain.

S. SEGNIERI.

T. Val Tuoi, &c.—S.M. Mont Pers.

S. STENOPETALA.

S.M. Val d'Agnelli, Julier Pass.

(Also many other species of this truly Alpine genus.)

PARNASSIA PALUSTRIS (Grass of Parnassus). Germ *Herzblatt*.

A plant with handsome white flowers, an inch or even more across, the petals having strongly marked veins. It is curious in having five perfect stamens and five imperfect ones, bearing, instead of anthers, a tuft of globular-headed filaments. S.M. extremely common; frequent also in Britain.

DROSERA LONGIFOLIA.

A curious little plant, two to five inches high, with radical leaves only; these are erect and elongated, broad at the extremity, and tapering towards the base; the blades of the leaves are densely covered with red hairs, each of which is tipped with a drop of viscid fluid. The small whitish flowers are borne on a wiry leafless stalk. S.M. Near the Stätzer See.

XVI. UMBELLIFERÆ.

Herbs with umbellate flowers, five epigynous stamens, and two styles.

ATHAMANTA CRETENSIS.

T. Scarl valley.

CAUCALIS DAUCOIDES (Small Bur Parsley).

T. Neighbouring valleys.

ASTRANTIA MINOR. Germ. *Sterndolde*.

S.M. Val Bevers. (July.)

GAYA SIMPLEX.

S.M. Piz Languard, summit.

XVII. CAPRIFOLIACEÆ.

Shrubs or herbs, with monopetalous epigynous corolla, epipetalous stamens, and three- to five-celled ovary.

LINNÆA BOREALIS (Twin Flower).

An interesting little plant, named after Linnæus, who was very fond of it. It is a slender evergreen, which creeps or trails along the ground, and has small, opposite, broadly ovate or obovate leaves, slightly toothed at the top. Its flowers are in pairs; they are fragrant, and of a delicate pale pink colour; small and bell-shaped, they droop gracefully from the slender branches of a long bifurcated peduncle. In Britain it is very rare, being found only in the 'firwoods of some of the eastern counties of Scotland, and in a single locality in Northumberland.' S.M. In many localities, in the woods at the base of Piz Rosatsch, amidst the stones on the right-hand side of the entrance of the Roseg valley, &c.—T. Amongst the stones scattered through the forests of Tarasp, near Fettau.

ADOXA MOSCHATELLINA (Tuberous Moschatel). Germ. *Bisamkraut*.

S.M. Alp Spignas. (June.) Common in Britain.

XVIII. VALERIANACEÆ.

Herbs with monopetalous epigynous corolla, stamens epipetalous, fewer than the corolla lobes. Fruit one-celled.

VALERIANA SUPINA. Germ. *Niedriger Baldrian*.

S.M. Val Bevers.—T. On alps of Seesvenna.

XIX. STELLATÆ.

GALIUM MONTANUM.

S.M. Adjacent meadows.

XX. COMPOSITÆ.

Herbs with flowers in compact heads, five syngenesious stamens, a one-celled inferior ovary, with one erect ovule.

ASTER ALPINUS. Germ. *Alpen Sternblume*.

A pretty composite flower of a violet blue colour, with an orange yellow eye, not unlike a large blue daisy. The flower is about an inch and a half across. The leaves are narrow and slightly downy. S.M. Val del Fain, near the Bernina Pass. Pontresina, rocks on right bank of stream; twenty minutes from hotel.—T. Meadows adjacent.

ERIGERON ALPIORUM.

Distinguished from preceding (*Aster alpinus*) by the scales of the involucre being narrow, sharply pointed, and violet-brown; in the *Aster* they are green, blunt and incurved. Flower-heads generally solitary on each stem. The outer florets are pink or purplish, very narrowly ligulate, forming a short coloured ray. The central tabular florets

are few and of a pale yellow. Leaves lanceolate, tapering at the base.
S.M. Summit of Piz Languard.

E. VILLARSH.

S.M. Rocks on right bank of stream; twenty minutes from hotel.
T. Near ruins of Steinsberg.

CHRYSANTHEMUM ALPINUM. Germ. *Alpen Wücherblume*.

Like a dwarf variety of the *Ox-eye Daisy*. S.M. Val Bevers.

C. HALLERI.

S.M. Salüver, near Celerina. (August.)

ARNICA MONTANA.

S.M. Abundant in all parts of the neighbourhood.

DORONICUM SCORPIOIDES (Leopard's Bane).

S.M. Val del Fain.

ACHILLEA MOSCHATA (Musk Yarrow). Germ. *Wild Frauli*.

An aromatic herb, from which is distilled a liqueur termed Iva. The leaves are alternate and very much divided pinnately into narrow segments. The whole plant is but a few inches high, terminated by a corymb of small flower-heads, with white rays and yellow disks. S.M. Val Bevers, &c.—T. Scarl valley, Val Tuoi, &c. (July.)

A. NANA.

S.M. Piz Languard, banks of the Lago Bianco, Bernina Pass.—T. Piz Minschun.

ARTEMISIA MUTELLINA.

S.M. Val Bevers; Pontresina, rocks on right bank of stream; twenty minutes from hotel.

A. SPICATA.

T. Piz Minschun.

GNAPHALIUM LEONTOPODIUM (Cudweed, or Alpine Lion's Foot).

Germ. *Edelweiss*.

A peculiar plant, said to grow in the line of perpetual snow, or even under the snow. The whole plant is covered with white velvety down; it has very little sap, and can therefore be preserved for a long while. The kind of large paw, which spreads itself out on the top of the stems, and looks something like a corolla, is formed of a number of white down-covered leaves, amongst which the small flowers, collected together in little heads, are concealed. S.M. Val Bevers, Val del Fain, &c.—T. Scarl valley, Piz Minschun, Val Tasna, &c. (Very common.)

G. HOPPEANUM. Germ. *Ruhrkraut*.

S.M. Piz Padella, near Samaden.

G. DIOICUM. Germ. *Häusiges Ruhrkraut*.

S.M. Val Bevers.

G. SYLVATICUM. Germ. *Wald-Ruhrkraut*.

S.M. Val Bevers.

G. CARPATHICUM.

S.M. Summit of Piz Languard.

ARONICUM GLACIALE. Germ. *Schwindelkraut*.

S.M. Piz Padella.

- HIERACIUM ALBIDUM. (Hawk-weed). Germ. *Weissliches Habichtskraut*.
S.M. Val Bevers.—T. Val Tuoi. (August.)
- H. ALPINUM (Hawk-weed). Germ. *Alpen Habichtskraut*.
S.M. Albula.
- H. GLACIALE.
S.M. Lago della Crocetta, near summit of Bernina Pass.
- H. AUREANTICUM.
S.M. Val Bevers, and on left bank of stream, about a mile from Morteratsch Glacier.
- H. VILLOSUM.
T. Valleys adjacent.
- H. PULMONARIOIDES.
T. Valleys adjacent.
- CENTAUREA NERVOSA (Knap-weed). Germ. *Flockenblume*.
S.M. near Samaden. (August.)
- C. RHÆTICA.
S.M. Val Bevers.
- C. MACULOSA.
T. Valleys adjacent.
- SOYERIA HYOSERIDIFOLIA.
S.M. Albula. (August.)
- CREPIS JUBATA. (Hawk's-beard).
S.M. Val Lavirum.—T. Fimber Pass.
- C. JACQUINII. Germ. *Pizzan*.
S.M. Val del Fain. (July.)—T. Pi Lat, &c.
- SENECIO CARNIOLICUS (Groundsell). Germ. *Krautliches Kreuzkraut*.
S.M. Summit of Piz Languard. (July.)—T. Mountains adjoining.
- S. ABROTANIFOLIUS (bright orange flowers).
S.M. Val Bevers, and Val del Fain.—T. Very common.
- S. NEBRODENSIS.
T. Adjacent valleys.
- S. NEMORENSIS.
S.M. Pontresina, rocks on right bank of stream; about a mile from hotel.
- SERRATULA RHAPONTICUM (Saw-wort).
T. Alps by Fétan.
- SAUSSUREA ALPINA.
Found also on Snowdon, and in the Scotch Highlands. S.M. Albula. (August.) Val del Fain.—T. Val Tuoi, Val Uina, &c.
- S. DISCOLOR.
S.M. Val Bevers.
- CARDUUS PLATYLEPIS (Thistle).
T. Adjacent valleys.

- CIRSIIUM ERIOPHORUM (Plume Thistle). } T. Adjacent valleys.
 C. ERISITHALIS. }
 TRAGOPOGON MAJUS (Goat's-beard).
 T. Adjacent valleys.

XXI. CAMPANULACEÆ.

Flowers generally bell-shaped, but sometimes irregular, with five epigynous stamens (anthers syngenesious in Lobelia) and a two- to five-celled ovary and indefinite ovules.

CAMPANULA CENISIA (Mont Cenis Harebell).

A plant growing at very great elevations; light green compact rosettes of leaves; flowers solitary, blue, somewhat funnel-shaped, but open and cut nearly to the base into five lobes. S.M. Albula.—T. Piz Minschun.

C. THYRSOIDES.

S.M. Val del Fain. The more common species of Campanula are abundant.

PHYTEUMA PAUCIFLORUM (Rampion). Germ. *Armbblütige Rapunzel*.

S.M. Alp Prunella. (July).—T. Piz Linard and Piz Minschun.

P. ORBICULARE.

S.M. Val Bevers.

P. HUMILE.

S.M. Val Bevers and Val del Fain.

XXII. ERICACEÆ.

The Heath Family.

Shrubby plants with wiry stems; flowers monopetalous; stamens, eight or ten, epigynous or hypogynous; anthers opening in two small terminal pores.

RHODODENDRON FERRUGINEUM. Germ. *Rothbrannen Alpenrose*.R. HIRSUTUM. Germ. *Zottige Alpenrose*.

This is the 'Alpenrose' of the Germans. Both species grow as low thick bushes, with tortuous and interlaced branches, having a hard black bark, and bearing leaves only at their extremities. The leaves of *R. hirsutum* are margined with a row of hairs. Those of the other species are longer, perfectly smooth, and of a dark shining green on the upper, but covered with a rust-coloured layer on the under surface; hence its name. The branches of flowers spring from the centre of the tufts of leaves. The calyx is scarcely visible. The corolla of the *R. hirsutum* is rather larger and more open than that of

the *R. ferrugineum*, and varies from a pale rose to a bright purple colour. The narrower and more compressed corolla of the other species has a less brilliant hue; it is also purple, but of a more sombre tint. S.M. Val Bevers. (July.)—T. Environs of Vulpera.

AZALEA PROCUMBENS. Germ. *Felsenstrauch*.

A low trailing shrub; leaves small, smooth, and rigid, with the margins remarkably rolled back; flowers flesh-coloured, in short terminal clusters or tufts. S.M. Alpotta, near Samaden.

PIROLA ROTUNDIFOLIA (Winter Green).

A plant with roundish leathery leaves only slightly toothed, and erect stems, bearing long and handsome slightly-drooping racemes of pure white fragrant flowers, half an inch across, ten to twenty being borne on a stem six inches to ten inches high. It is marked by its long style, bent down, and at its extremity curved upwards. S.M. Common on the hills around and by the Stätzer See.

P. UNIFLORA (One-flowered Winter Green).

A very pretty plant, with ovate leaves, and bearing one large, elegant, white, highly fragrant flower. T. Adjacent valleys.—S.M. By Stätzer See. (July.)

P. CHLORANTA.

T. Adjacent valleys.

ERICA CARNEA (Spring Heath). Germ. *Fleischfarbene Heide*.
S.M. Bevers. (April.)

ARCTOSTAPHYLOS ALPINA (Black Bear Berry).

Flowers white, with a purplish tinge. S.M. Common.

CALLUNA VULGARIS (Common Heath). Germ. *Besenheide*.
S.M. Val Bevers. (Sept.)

XXIII. PRIMULACEÆ.

Herbs with a monopetalous hypogynous corolla, five epipetalous stamens opposite to the corolla lobes, and a free, central placenta. The following are only a few of the many beautiful species of the genus *Primula* which abound in this region.

PRIMULA FARINOSA (Bird's-eye Primrose). Germ. *Mehlige Primel*.

Found also in Scotland and the north of England. The stems, from three to twelve inches high, are slender and powdery, and spring from rosettes of musk-scented leaves, having their under surface covered with a silvery-looking meal; the flowers are small, in graceful clusters of a lilac-purple colour. S.M. Val Bevers. (June.)

P. INTEGRIFOLIA (Entire-leaved Primrose).

A very dwarf species, having smooth, entire, ciliated leaves, lying quite close to the ground, and handsome rose-coloured flowers, with deeply divided lobes, large enough to obscure the plant that bears them. S.M. Val Bevers. (May.)

P. VISCOSA (Viscid Primrose).

Leaves dark green, obovate or nearly orbicular, with closely-set teeth, covered with glandular hairs and viscid on both sides; the flowers are of a rosy purple, with white eyes. S.M. Val Bevers (April), and rocks leading to Morteratsch glacier.—T. Val d'Assa, Val Uina, &c.

P. GRAVEOLENS.

S.M. Piz Gravatscha.

P. LATIFOLIA.

A very handsome species, and sweet-scented, bearing from two to twenty violet flowers in a head, on a stem about twice as long as the leaves. The leaves are large, and sometimes nearly two inches broad, toothed and covered on both surfaces with glandular hairs. S.M. Rocks leading to Morteratsch glacier.

P. MURETIANA.

S.M. Val Bevers (July) and Agagliogs rocks, Roseg glacier.

CORTUSA MATTHIOLI (Bear's-ear Sanicle). Germ. *Bär Sanikel*.

T. Adjacent valleys. (June.)

ANDROSACE CHAMÆJASME (Rock Jasmine).

Leaves fringed and forming large rosettes; flowers on stout little stems from one to five inches high, white at first, with a yellow eye, which changes to a deep crimson, the outer part to a delicate rose. S.M. Val Bevers. (July.)

A. OBTUSIFOLIA.

Allied to preceding, but rosettes of leaves larger; the leaves themselves oblong-lanceolate; flowers two to five together at the summit of the stems, white or rose-coloured, with yellow eyes. S.M. Val Bevers.

A. GLACIALIS (Pink Flowers). Germ. *Gletscher Manschild*.

S.M. Val Bevers, Piz Languard, Cima di Margna.

A. SEPTENTRIONALIS.

S.M. Near Samaden.

TRIENTALIS EUROPEÆ (Star Flower). Germ. *Siebenstern*.

A delicate plant, extremely rare in the Alps, with erect slender stems, not more than six inches high, bearing a whorl of five or six leaves, of different sizes, from one inch to two inches in length. From the centre of the whorl spring one to four flower stems, each supporting a small white or pink-tipped star-shaped flower. S.M. Alp Nova, near Pontresina, and on left bank of stream, about a mile from Morteratsch glacier.

SOLDANELLA ALPINA. Germ. *Alpenglöckli*.

A most interesting plant, growing near the snow-line, having beautiful pendent pale-blue open bell-shaped flowers, cut into numerous narrow linear strips, three or four being borne on a stem two to six inches high; the leaves are radical, small, leathery, shining, roundish or reniform. S.M. Val Bevers.

S. PUSILLA.

Leaves kidney-shaped; flowers not so deeply cut as in preceding species. S.M. Cambrena glacier and Agagliogs rocks, Roseg glacier.

XXIV. GENTIANACEÆ.

Bitter herbs with a hypogynous regular corolla; the lobes twisted in the bud; stamens alternate with the corolla lobes; ovary usually one-celled, with parietal placentas.

GENTIANA VERNA. Germ. *Frühlings Engian*.

One of the most beautiful if not *the* most beautiful of Alpine flowers. Its leaves are small and leathery, ovate or oblong, and in dense tufts. The flower stems are so short that the flowers appear sessile on the tufts of leaves. Each stem bears a single terminal flower of a splendid bright-blue colour. The tube of the corolla is cylindrical and nearly an inch long; the limb is broad and spreading, with five ovate lobes and smaller two-cleft ones between them. S.M. Bevers, &c.

G. BAVARICA.

A native of the high Alps, and resembling in its bloom the vernal gentian, from which it is distinguished by its smaller box-like leaves, of a yellowish-green tone, and longer flower stems. The flowers are of the deepest and most brilliant blue. S.M. Val Bevers.

G. NIVALIS.

A high Alpine plant, with slender erect stems two to four inches high; sometimes only an inch in height, and bearing a solitary small blue starlike flower, having the same characters as that of the vernal gentian, but very much smaller. S.M. Meadows near Samaden, path leading to Roseg glacier. (July).—T. Piz Minschun.

G. EXCISA.

S.M. Val Bevers. (June.)

G. BRACHYPHYLLA.

S.M. Adjacent meadows. (July.)

G. OBTUSIFOLIA.

S.M. Val Bevers. (August.)

G. CILIATA.

S.M. Celerina. (August.)

G. CHARPENTIERI.

S.M. Val Bevers.

G. PUNCTATA.

S.M. Near Stätzer See.—T. Val Tuoi.

MENYANTHES TRIFOLIATA (Buckbean). Germ. *Dreiblättriger Bitterblee*.

Flowers white, bell-shaped, deeply five-lobed, fringed inside with white hairs, tinged externally with red, in an oblong raceme. Calyx short, with rather broad green lobes. Leaves in a dense tuft, each having a long sheathing stalk, and three obovate leaflets. S.M. Bevers. (June.) And other species.

XXV. POLEMONIACEÆ.

POLEMONIUM CÆRULEUM (Jacob's Ladder).

A familiar garden plant, with pinnate leaves, and showy blue or white flowers. Monopetalous corolla, with a short tube and a broad,

open, five-cleft limb. Stamens five, bearded at the base. Ovary three-celled. S.M. Albula (July), and path leading to Roseg glacier.—T. Near Ardetz, &c.

XXVI. BORAGINEÆ.

Rough herbs, with alternate leaves and regular or nearly regular monopetalous flowers; stamens same number as corolla lobes (five); ovary four-lobed.

MYOSOTIS ALPESTRIS (Alpine Forget-me-not). Germ. *Vergissmeinnicht*.

Found rarely in Scotland and the north of England. It has beautiful bright clear blue flowers with small yellowish eyes. 'Inferior to no gem of the high Alps in vivid colour and beauty.' S.M. Alp Signas. (June.)

M. NANA, or **ERITRICHIUM NANUM**.

A very dwarf species, scarcely two inches high, but with comparatively large brilliant blue flowers. S.M. Summit of Piz Languard.

PULMONARIA AZUREA (Lungwort).

Coarsely hairy radical leaves, nearly oval and acute at the apex, and marked on the upper surface with white blotches. Corolla blue, with a straight tube open at the mouth, without scales, and a spreading five-lobed limb. Flowering stems from six inches to a foot high. T. Val Tasna.

ECHINOSPERMUM DEFLEXUM.

Has all the appearance and small flowers of a Myosote, but with triangular very rough nuts. T. Adjacent meadows.

XXVII. OROBANCHACEÆ.

Broom-rape family, consisting of parasitic plants, distinguished by the absence of green leaves. The floral characters are nearly those of the *Scrophularinæ*.

OROBANCHE CRUENTA.

T. Near Schuls. (Rare.)

O. ARENARIA.

T. Common.

O. LUCORUM.

T. Very common.

XXVIII. SCROPHULARINEÆ.

Herbs with irregular monopetalous, generally personate corolla; stamens fewer than the corolla lobes (except *Verbascum*); ovary two-celled, many-seeded.

VERONICA CHAMÆDRYS (Germander Speedwell).

A well-known native plant. S.M. Val Bevers, &c.

VERONICA SPICATA.

Flowers in long dense spikes, blue or pale pink. S.M. Val Bevers. (July.)

V. PROSTRATA.

A dwarf spreading plant, less than six inches high; stems downy, flowers deep blue, sometimes rose-coloured and white. It flowers very freely, so that the leaves are often quite obscured by the flowers. T. Adjacent valleys.

V. SAXATILIS.

On Alpine rocks, often at great elevations. A dwarf, bush-like plant, with pretty blue flowers, striped with violet, with a narrow crimson ring near the bottom of the corolla, its base being pure white. S.M. Val Bevers.

V. BELLIDIOIDES. Germ. *Ehrenpreis*.

S.M. Val Bevers.

V. OFFICINALIS.

S.M. Val Bevers.

LINARIA ALPINA (Alpine Toad-flax). Germ. *Alpen Leinkraut*.

A truly Alpine plant, forming dense, dwarf, silvery tufts, covered with bluish-violet flowers, with two spots of intense orange in the centre of the lower division of each. S.M. Bevers. (June.)

PEDICULARIS INCARNATA (Red Rattle).

S.M. Val del Fain, Val Bevers.—T. Alps by Fettan.

P. ROSTRATA.

S.M. Val Bevers.

P. RECUTITA.

T. Val Tuoi.

P. TUBEROSA.

S.M. Val Bevers.

P. ASPLENIFOLIA.

T. Alps of Samnaun.

P. TAQUINII.

T. Val Triazza.

EUPHRASIA LUTEA (Yellow Eye-bright).

T. near Naiss.

XXIX. LABIATÆ.

Herbs, with an irregular usually two-lipped corolla; stamens fewer than the corolla lobes; ovary four-lobed; style from between the lobes.

DRACOCEPHALUM RUYSCHIANA.

A showy plant with blue flowers more than an inch long, in rather close spikes at the summit of the stem. The leaves smooth, narrow, entire, and opposite. S.M. Near Samaden.

D. AUSTRIACUM.

Larger flowers than preceding, in whorled spikes. Floral leaves velvety, trifid; the leaves three or five cleft with narrow segments.

CALAMINTHA ALPINA (Alpine Basil).

S.M. Val Bevers.

SALVIA VERTICILLATA.

T. Meadows adjacent.

GALEOPSIS VERSICOLOR (Large-flowered Hemp-Nettle).

The flowers are large, yellow, with a broad purple spot upon the lower lip. T. Meadows adjacent.

XXX. ORCHIDACEÆ.

CORALLORHIZA INNATA (Coral Root).

Marked by its curiously toothed roots, which in figure resemble branched coral. T. Val Uina, &c.

EPIPOGIUM GMELINI.

T. Scarl valley.

GOODYERA REPENS.

T. Fir-woods around.

GYMNANDRIA ODORATISSIMA.

T. Adjacent forests.

ORCHIS GLOBOSA.

S.M. Val del Fain.

XXXI. LILIACEÆ.

Monocotyledons with parallel-veined leaves, petaloid, coloured perianths of six divisions, six stamens, and superior syncarpous, three-celled ovary.

LLOYDIA SEROTINA (Mountain Lloydia). Germ. *Graslinie*.

A delicate little plant, with a small bulb and two or three almost thread-like leaves, and a slender stem, about three or four inches high, bearing a single white star-like flower, about three-quarters of an inch across. The segments of the perianth marked inside with three longitudinal reddish lines and a small yellow spot at the base. S.M. Gravatscha near Bevers. (June.)

PARADISIA LILIASTRUM (St. Bruno's Lily).

A beautiful white lily-like flower, found generally in the warmer Alpine valleys. The half-pendent blooms about two inches long, are of a clear and delicate white, each division faintly tipped with pale-green. There are two to five flowers on each stem. S.M. Val Bevers.

LILIUM BULBIFERUM.

S.M. Val del Fain.

GAGEA LIOTTARDI.

S.M. Val Bevers.

ALLIUM SCHÆNOPRASUM (Chive Allium).

Leaves very narrow, cylindrical, and hollow. Umbel contracted into a dense globular head of rather large purplish flowers; perianth, segments three to four lines long, very pointed. S.M. Val Bevers.

ALLIUM VICTORIALIS.

T. Val Tasna.

MAIANthemum BIFOLIUM. Germ. *Zweiblättrige Schattenblume*.

A graceful little plant, allied to the lily of the valley, from which it is distinguished by having its perianth divided to the base into four segments. It has two leaves to the stem, and a terminal raceme of two small white flowers. S.M. Bevers. (July.)

TOFIELDIA BOREALIS.

S.M. Cambrena. (July.) T. Col de Joata.

ANTHERICUM LILIAGO.

T. Adjacent meadows.

XXXII. JUNCACEÆ.

The Rush family are separated from the Liliaceæ by their scarious perianth, and their very minute embryo; and from the sedges, which they resemble in general aspect, by possessing a complete six-leaved perianth.

JUNCUS TRIGLUMIS (Three-flowered Rush). Germ. *Z'balgige Simse*.

S.M. Albula. (August.)

J. ARCTICUS.

S.M. Sandy Plain between Silser See and Silvaplaner See.

J. TRIFIDUS.

S.M. Albula.

LUZULA LUTEA.

L. SPICATA (Spiked Woodrush). Germ. *Genährte Hainsimse*.

S.M. Piz Ot. (August.)

L. SPADICEA and L. ALBIDA.

S.M. Piz Spignas. (August.)

XXXIII. CYPERACEÆ.

The Sedge family are distinguished from the Rushes by the absence of any regular perianth, and from the grasses by their leaves being elosed round the stem, by the want of an inner scale or palea between the flower and the axis of the spikelet, and by the simple, not feathery, branches of the style.

CAREX FIRMA. Germ. *Steifblättrige Segge*.

S.M. Albula. (August.)

C. VAHLII (Alpine Carex).

In Britain, only in the Clova mountains of Scotland. S.M. Albula, Val Bevers, Piz Languard.

C. BUXBAUMII.

S.M. Near Samaden.

C. MICROGLOCHIN.

S.M. Val Bevers.

CAREX IRRIGUA.

S.M. Albula.

C. CESPITOSA.

Common.

ERIOPHORUM SCHOUCHZERI (Cotton Sedge).

S.M. Near Piz Corvatsch.

SCIRPUS TABERNÆMONTANI.

T. Near Crusch.

S. ALPINUS. Germ. *Alpen Binse*.

S.M. Val Bevers. (May.)

KOBRESIA CARICINA.

S.M. Albula. (August.)

ELYNA SPICATA.

S.M. Albula. (July and August.)

XXXIV. GRAMINEÆ.

Sheathes of leaves split in front. Innermost glume (palea) two nerved.

STIPA PENNATA (Feather-grass).

A very beautiful delicately feathered grass, not found in Britain.
S.M. Val Bevers.—T. Rocks near Ardetz, &c.

KÆLERIA HIRSUTA.

S.M. Near Samaden and Lago della Crocetta, near Bernina Pass.

PHOCA AUSTRALIS. Germ. *Bergliese*.

S.M. Albula. (June.)

P. FRIGIDA.

S.M. Near Samaden.

MELICA CILIATA.

T. Near Sehuls.

LOLIUM LINICOLUM.

T. Near Sehuls.

AVENA SUBSPICATA.

S.M. Lago della Crocetta.

POA LAXA.

S.M. Summit of Piz Languard.—T. Piz Cotschen.

FESTUCA SCHINCHZERI.

T. Piz Minschun.

F. HALLERI.

S.M. Summit of Piz Languard.

SESLERIA DISTICHA.

T. Piz Minschun.—S.M. Piz Ot. (August.)

TRIGLOCHIN PALUSTRE (Arrow-grass). Germ. *Dreizahn*.

S.M. Bernina.

AGROSTIS RUPESTRIS.

S.M. Summit of Piz Languard.

APPENDIX I.

(ADDITIONAL SPECIES.)

FUMARIA VAILLANTII . . .	Nat. Ord. Fumariaceæ.
S.M. Bevers.	
ARETIA GLACIALIS . . .	„ Primulaceæ.
S.M. Val Bevers.	
ARMERIA ALPINA (Alpine Thrift) .	„ Plumbagineæ.
S.M. Near Muhlen.	
HIPPOPHÆ RHAMNOIDES (Sea Buck-thorn) . . .	„ Elæagnaceæ.
T. Adjacent valleys.	
LINUM CATHARTICUM (Purging Flax).	
Germ. <i>Purpier Lein</i> . . .	„ Linaceæ.
S.M. Alpotta, near Samaden.	
RUMEX NIVALIS . . .	„ Polygonaceæ.
T. Adjacent valleys.	
SALIX PENTANDRA (Bay-willow).	
Germ. <i>Funfmässige Weide</i> .	„ Amentaceæ.
S.M. Val Bevers. (August.)	
S. GLAUCA . . .	„ „
S.M. Albula.—T. Val Lavinuoz.	
S. HEGETSCHWEILEREI . . .	„ „
T. Val Uina and Val Triazza.	
TAMARIX GERMANICA . . .	„ Tamariscineæ.
S.M. Val Bevers. (June.)	
GLOBULARIA CORDIFOLIA . . .	„ Globulariæ.
Pretty blue flowers in a globose head. Inferior 5-cleft monopetalous corolla. Stamens four; ovary with one cell and one ovule; a representative of a small natural order allied to the Verbonaceæ. S.M. Guardoval.	
WOODSIA HYPERBOREA . . .	„ Filices.
S.M. Near the fall of the Inn, &c.—T. Near Lavin.	
ASPLENIUM SEPTENTRIONALE . . .	„ „
S.M. Rocks leading to Morteratsch Glacier.	
CRYSTOPTERIS ALPINA . . .	„ „
T. Val Uina.	

GRIMMIA INCURVA	Nat. Ord. Musci.	
S.M. The Grat between Mont Pers and Piz Cambrena, Piz Languard.		
G. APICULATA	„	„
S.M. Cima di Margna.		
BRYUM CINCLIDIODES	„	„
S.M. Septimer Pass.		
B. CULLATUM, and B. LUDWIGII	„	„
S.M. Banks of Lago Bianco, Bernina Pass, and Piz Languard.		
DICRANUM MUHLENBECKII	„	„
S.M. Alp Err.		
ENCALYPTA APOPHYSATA	„	„
S.M. Val Lavirum.		
HYPNUM JULACEUM	„	„
S.M. Val Lavirum.		
H. AIRRHATUM	„	„
S.M. Val Faller.		
ORTHOTRICHUM KILLIASII	„	„
S.M. Piz Languard.		
POLYTRICHUM SEPTENTRIONALE	„	„
S.M. Piz Languard, Septimer Pass.		
LECANORA VENTOSA	„	Lichenes.
S.M. Grat between Mont Pers and Piz Cambrena.		
LECIDEA ARMENIACA	„	„
S.M. Cima di Margna.		
GYROPHORA ANTHRACINA	„	„
S.M. Grat between Mont Pers and Piz Cambrena.		
G. POLYMORPHA	„	„
S.M. Cima di Margna.		
ENDOCARPON INTESTINIFORME	„	„
Near Mühlen.		
CETRARIA NIVALIS, and C. CUCULLATA	„	„
S.M. Grat between Mont Pers and Piz Cambrena.		

APPENDIX II.

A LIST OF COLEOPTEROUS INSECTS (BEETLES) OBSERVED IN THE
NEIGHBOURHOOD OF TARASP.

SPECIES FOUND IN THE VALLEYS.

<i>Cicindela riparia</i> .	<i>Malthodes flavoguttatus</i> .
<i>Lebia crux minor</i> .	<i>Isomira hypocrita</i> .
<i>Harpalus honestus</i> .	<i>Oedemera virescens</i> .
— <i>latus</i> .	<i>Toucartia squamulata</i> . Near
<i>Cymindis angularis</i> . Near Fettau.	Schuls.
<i>Carabus gemmatus</i> .	<i>Phyllobius psittacinus</i> .
— <i>Neesii</i> .	— <i>atrovirens</i> .
<i>Boletobius pygmæus</i> . Near Schuls.	<i>Otiorhynchus rhæticus</i> .
<i>Bryoporus rufus</i> .	— <i>hirticornis</i> .
<i>Omalius florale</i> .	— <i>helveticus</i> .
<i>Oxytelus inustus</i> . Near Schuls.	<i>Cleonus cinereus</i> .
<i>Silpha alpina</i> .	<i>Magdalinus violaceus</i> .
<i>Onthophagus austriacus</i> .	<i>Pachyta interrogationis</i> .
<i>Aphodius obscurus</i> .	— <i>clathrata</i> .
— <i>alpinus</i> . Near Guarda.	<i>Cryptocephalus lobatus</i> .
— <i>depressus</i> .	— <i>interruptus</i> .
<i>Cetonia floricolor</i> .	<i>Tetropium luridum</i> .
<i>Ancylocheira rustica</i> .	<i>Callidium violaceum</i> .
<i>Dolopius marginatus</i> .	<i>Clytus Verbasci</i> .
<i>Diacanthus melancholicus</i> . Near	<i>Oberea pupillata</i> .
Fettau.	<i>Toxotus cursor</i> .
<i>Athous vittatus</i> .	<i>Pachybrachys hieroglyphicus</i> .
<i>Agriotes gallicus</i> .	<i>Oreina intricata</i> .
<i>Cardiophorus musculus</i> .	— <i>venusta</i> .
<i>Pheletes Bructeri</i> .	— <i>speciosa</i> .
<i>Cantharis abdominalis</i> .	— <i>pretiosa</i> .
— <i>Erichsonii</i> .	<i>Phratora major</i> .
<i>Podabrus alpinus</i> .	<i>Longitarsus Verbasci</i> .
<i>Ragonycha rufescens</i> .	<i>Anoncodes rufiventris</i> .
— <i>testacea</i> .	<i>Malachius geniculatus</i> .
<i>Telephorus albomarginatus</i> .	<i>Scymnus ater</i> . Near Schuls.

SPECIES FOUND ON THE MOUNTAINS.

<i>Cicindela alpestris</i> .		<i>Basytes obscurus</i> .	
<i>Cychrus attenuatus</i> . Alps of Fless.		— <i>alpigroidus</i> .	
<i>Nebria Germari</i> . Alps of Feltan.		<i>Geotrypes alpinus</i> .	
<i>Amara bifrons</i> . Alp of Urschai.		<i>Anthaxias helvetica</i> .	
<i>Pterostichus alpestris</i> .		<i>Corymbites rugosus</i> .	
<i>Bembidium glaciale</i> .		<i>Otiorhynchus maurus</i> . Val Uina	
<i>Helophorus glacialis</i> .		— <i>rivalis</i> . Val Lischanna.	
<i>Argutor alpestris</i> . Val Urschai.		— <i>insculptus</i> . Val Urschai.	
<i>Philonthus micans</i> .	"	— <i>alpicola</i> . Piz Lat.	
— <i>picipennis</i> .	"	<i>Lina alpina</i> . Val Lischanna.	
<i>Stenus flum</i> .	"	— <i>Escheri</i> .	"
<i>Homalotha alpicola</i> .	"	<i>Phædon salicinum</i> .	"
<i>Byrrhus pulchellus</i> .	"	<i>Capsus nitidus</i> . Val Urschai.	

APPENDIX III.

A LIST OF CERTAIN MOLLUSCA FOUND IN THE NEIGHBOURHOOD OF
TARASP.

Succinea Pfeifferi.
Helix arbustorum, *subalpina*.
— *zonata*.
— *edentula*.
— *fulva*.
— *rupestris*.
— *strigella*.
— *obvia*.
— *ruderator*.
— *glabra*.
— *nitens*.
— *nitidosa*.
— *crystallina*.

Bulimus acicula.
— *lubricus*.
— *montanus*.
Pupa quadridens,
— *inornata*.
— *minutissima*.
— *marginata*.
— *avena*.
— *seeale*.
Balea fragilis.
Clausilia plicata.
— *cruciata*.
Limneus pereger.

APPENDIX IV.

LIST OF CERTAIN MINERALS IN THE ENVIRONS OF TARASP.

Rock crystal. Piz Minschun, near
Aschera.
Epidote. Near Aschera, and else-
where.
Albite.
Garnet. In the erratic blocks of
Mica-schist, near Vulpera.
Cat's Eye. In the dioritic rocks,
near Aschera.
Andalusite. Fluela Pass.
Asbestos. Near Vulpera, and else-
where.
Soap-stone. Near Vulpera, and else-
where.

Tremolite. Near Pradella, and on
Piz Minschun.
Picrolite. In the serpentine.
Schillerspar. "
Magnesite. Near the castle of Ta-
rasp.
Arragonite. Near the castle of Ta-
rasp.
Calcite. Near the castle of Tarasp.
Anhydrite. Near Steinsberg.
Chrome-iron with nickel hydrate.
Near the castle of Tarasp.
Taraspite. Near Vulpera.
Lead-glance with silver. Scarl
valley—old mines.

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